91-06111/

QUANTITATION OF XPS INTENSITY RATIOS FOR SUPPORTED CATALYSTS

Final Report

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Energy Technology
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QUANTITATION OF XPS INTENSITY RATIOS

FOR SUPPORTED CATALYSTS

APPENDIX 3

PART I

XPS SPECTRA

HZSM-5 ZEOLITES
ALUMINA-SUPPORTED NICKEL AND MOLYBDENUM OXIDES

59 pp

MICROMEDIA

CONTENTS

Sample	Identification	Pretreatment	Spectra No.
HZSM-5	sample A	calcined	ASA 5
HZSM-5	sample B	calcined	ASA 6
			ASA 9
182	3.36% Ni/Al_2O_3	calcined	ASA 34
		calc.grnd[a]	ASA 35
183	9.30% MO/Al_2O_3	calcined	ASA 36
		calc.grnd[a]	ASA 37

(a) calcined, then ground

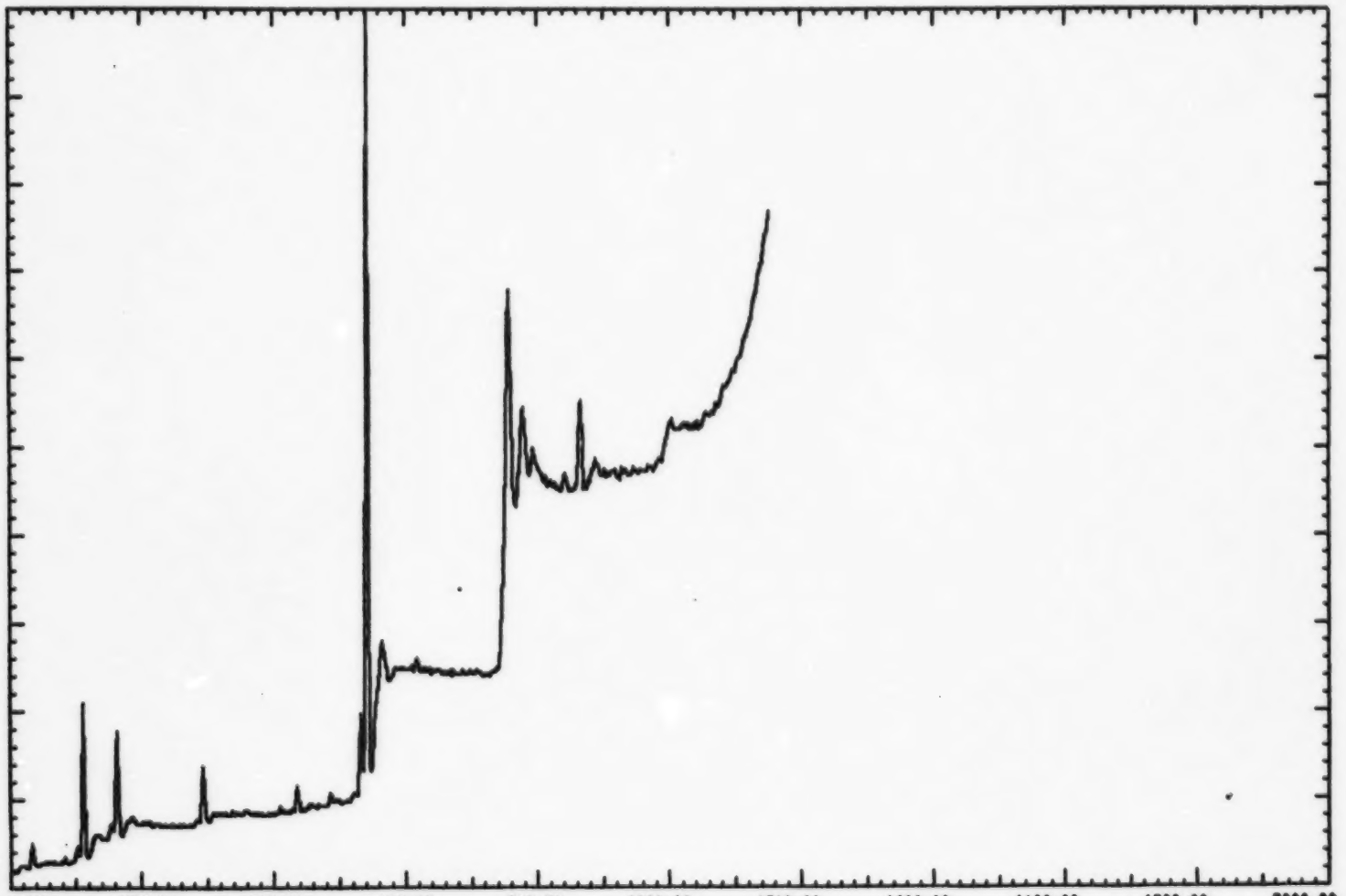
HZSM-5 Sample A

HZSM-5 Sample A

CALCINED

ASA5 Region 1 SURVEY VG SCIENTIFIC

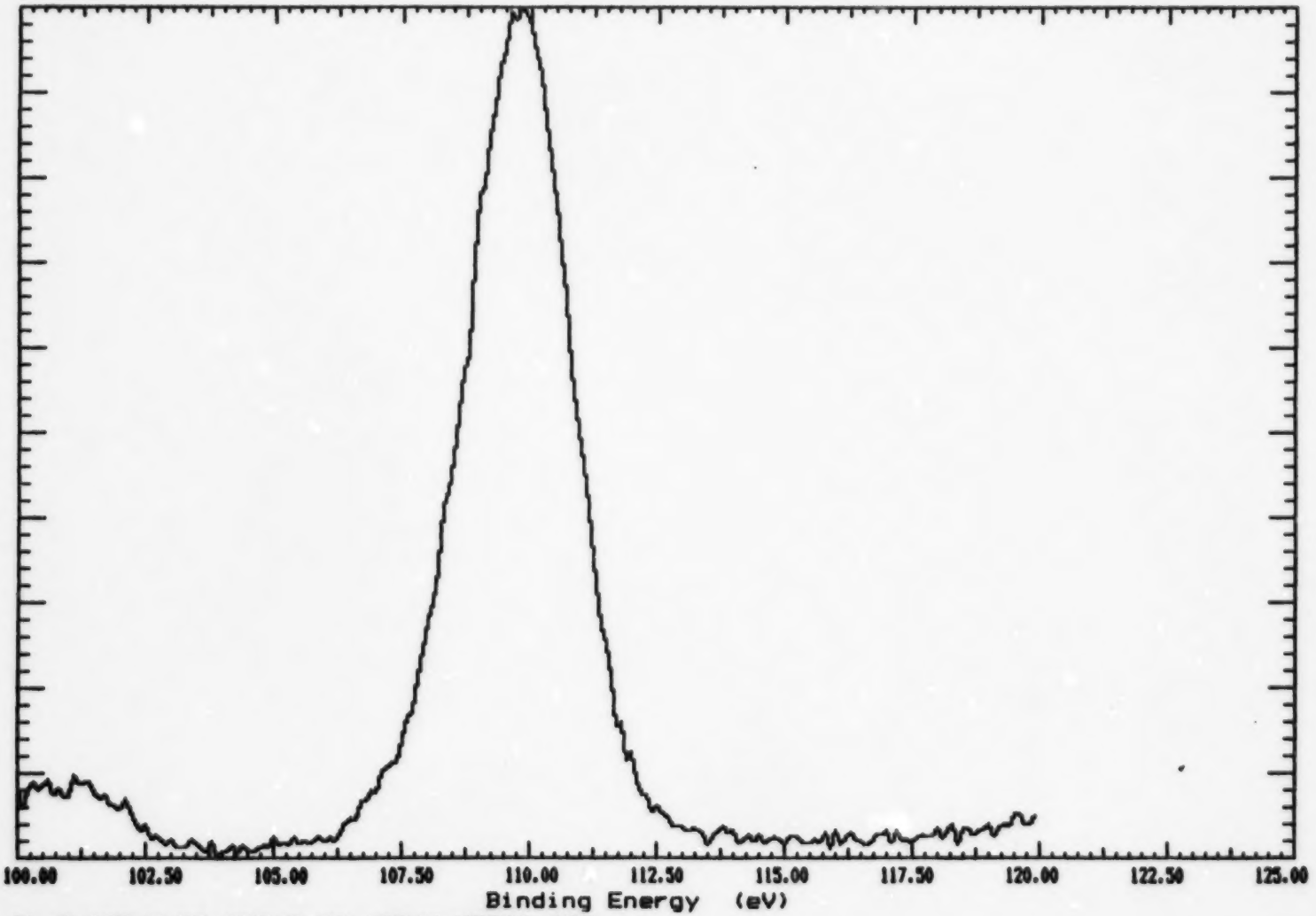
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 132279
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 2 SI2P VG SCIENTIFIC

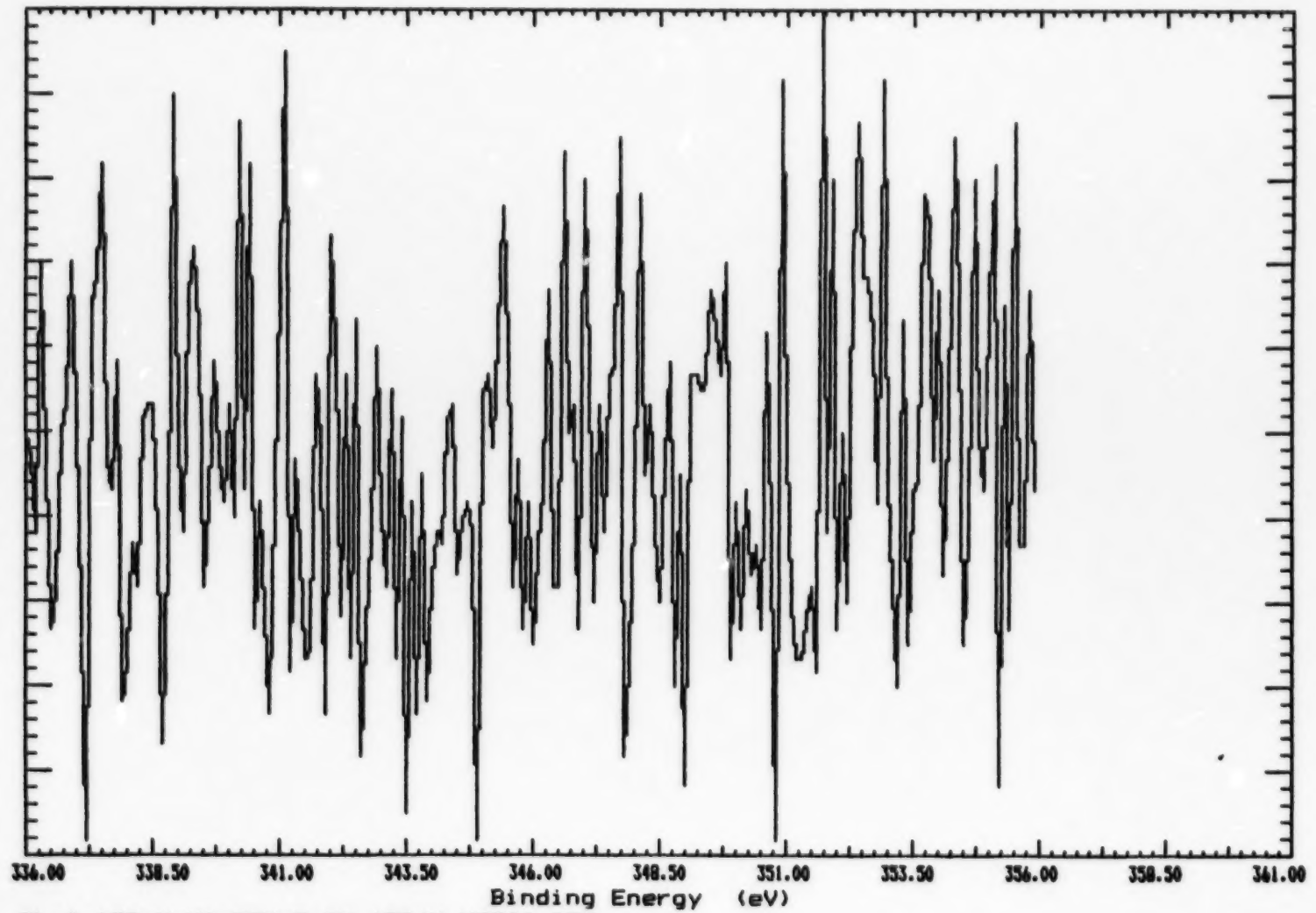
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5751
Step Size = 0.10 eV. 14 Scans of 200 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 3 PD3D VG SCIENTIFIC

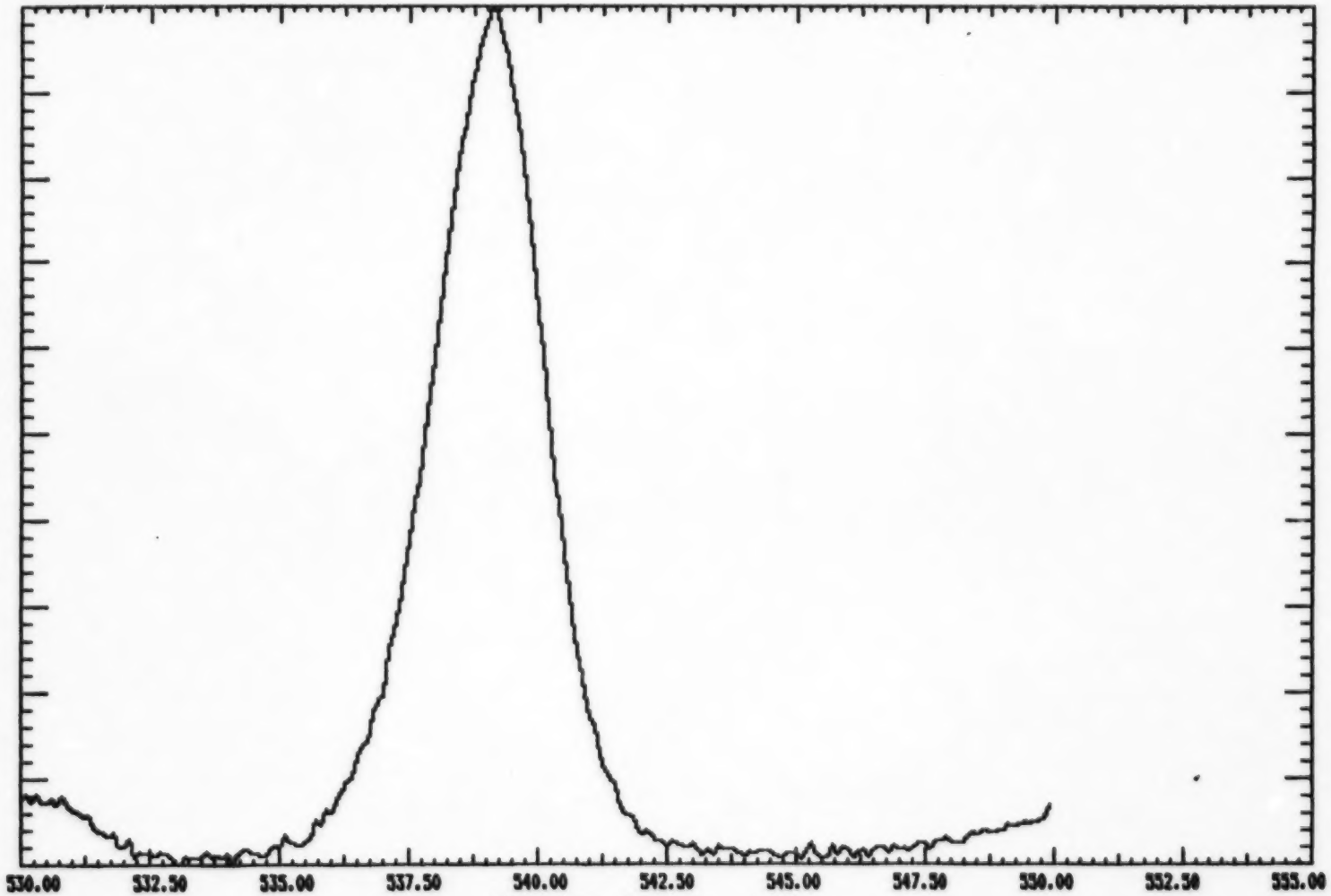
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1200
Step Size = 0.10 eV. 1 Scans of 200 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 4 O1S VG SCIENTIFIC

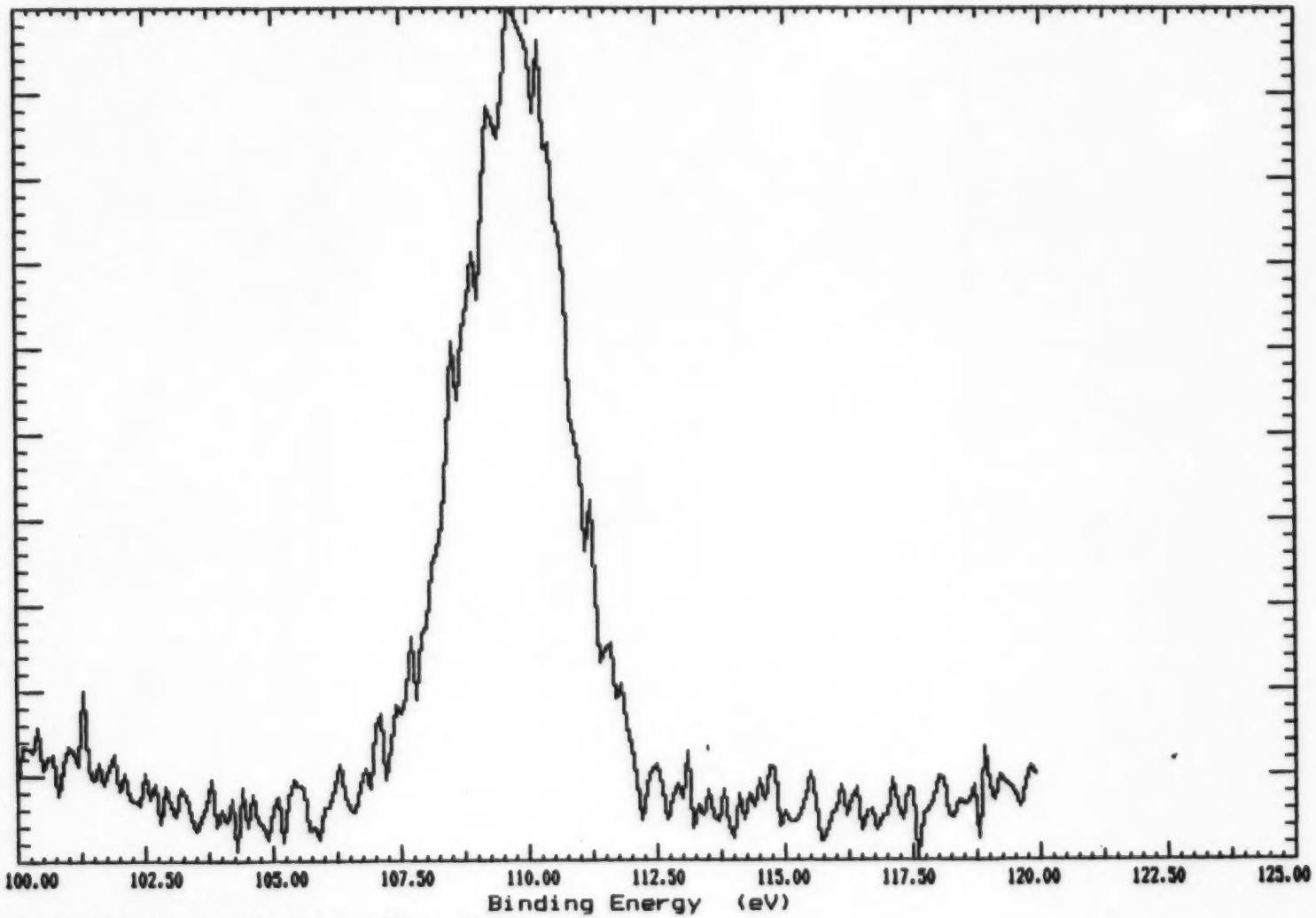
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 30275
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 5 SI2P VG SCIENTIFIC

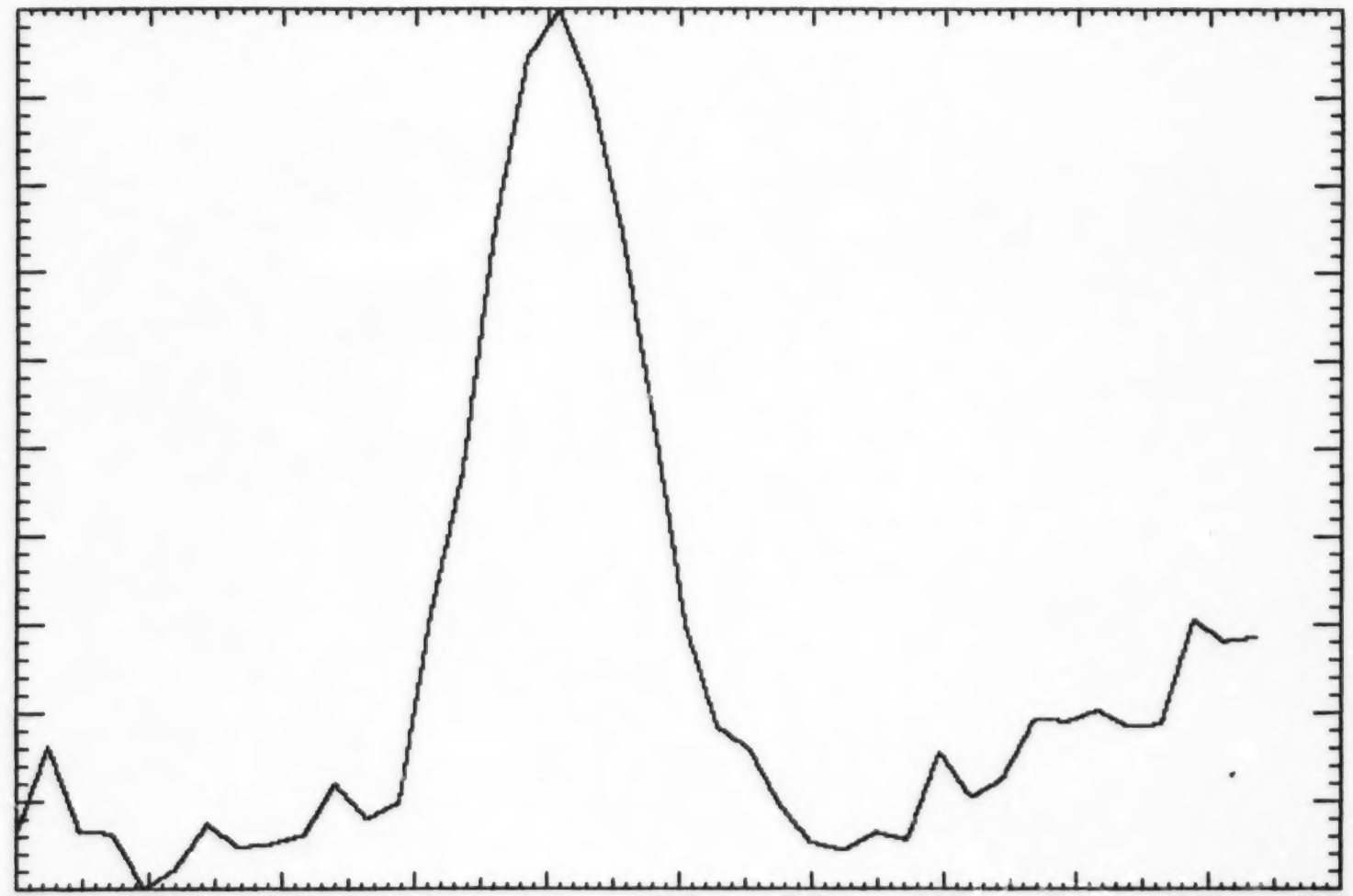
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 6380
Step Size = 0.10 eV. 1 Scans of 200 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 6 AL2P VG SCIENTIFIC

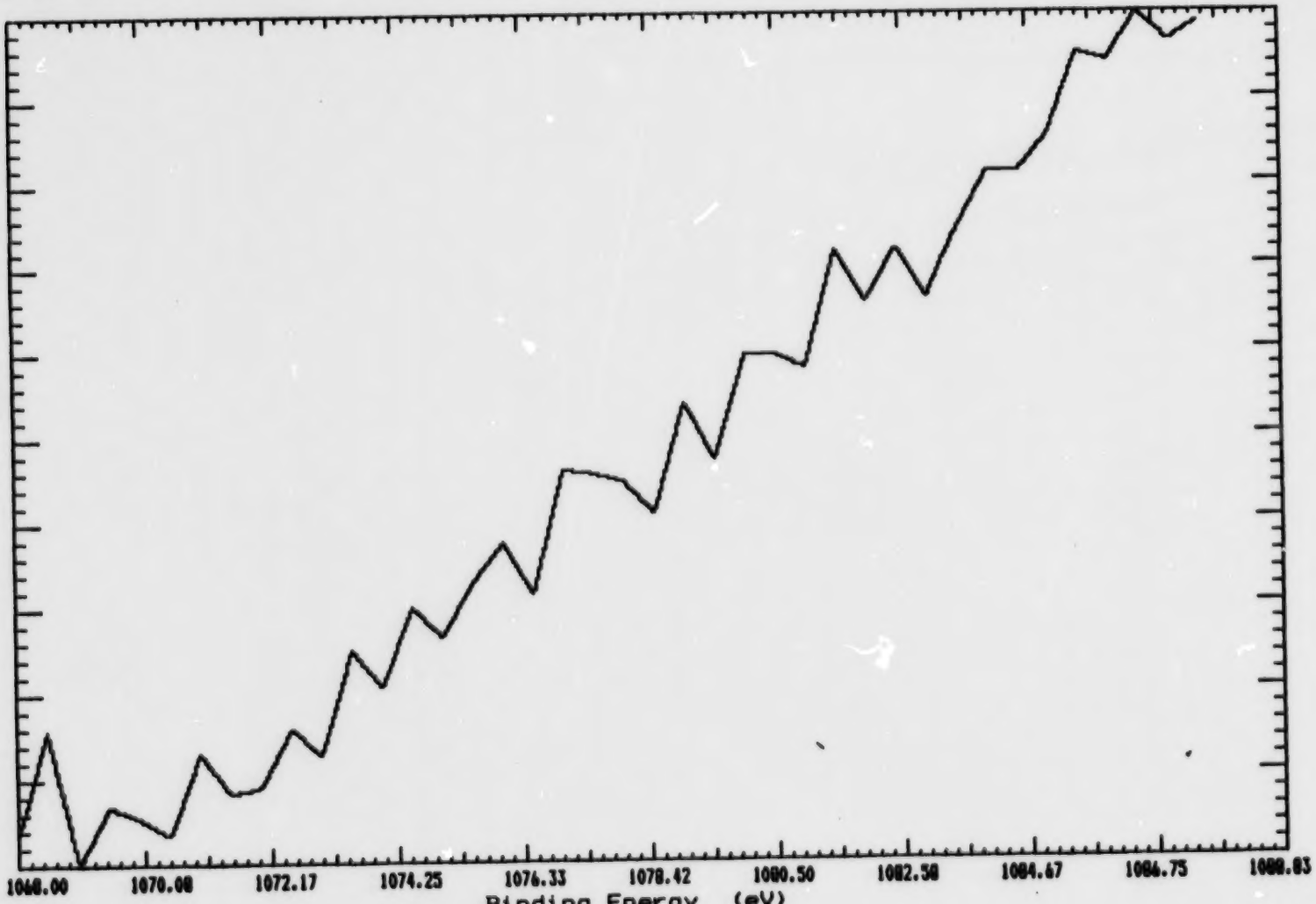
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 1005
Step Size = 0.50 eV. 68 Scans of 40 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

ASA5 Region 7 NA1S VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3267
Step Size = 0.50 eV. 100 Scans of 40 channels at 50 ms per chan



GL-4-128-H-NA-ZSM-5 CM 15D/H MG300 REF
OPT SI2P+MECA
1H00 24 NV 89

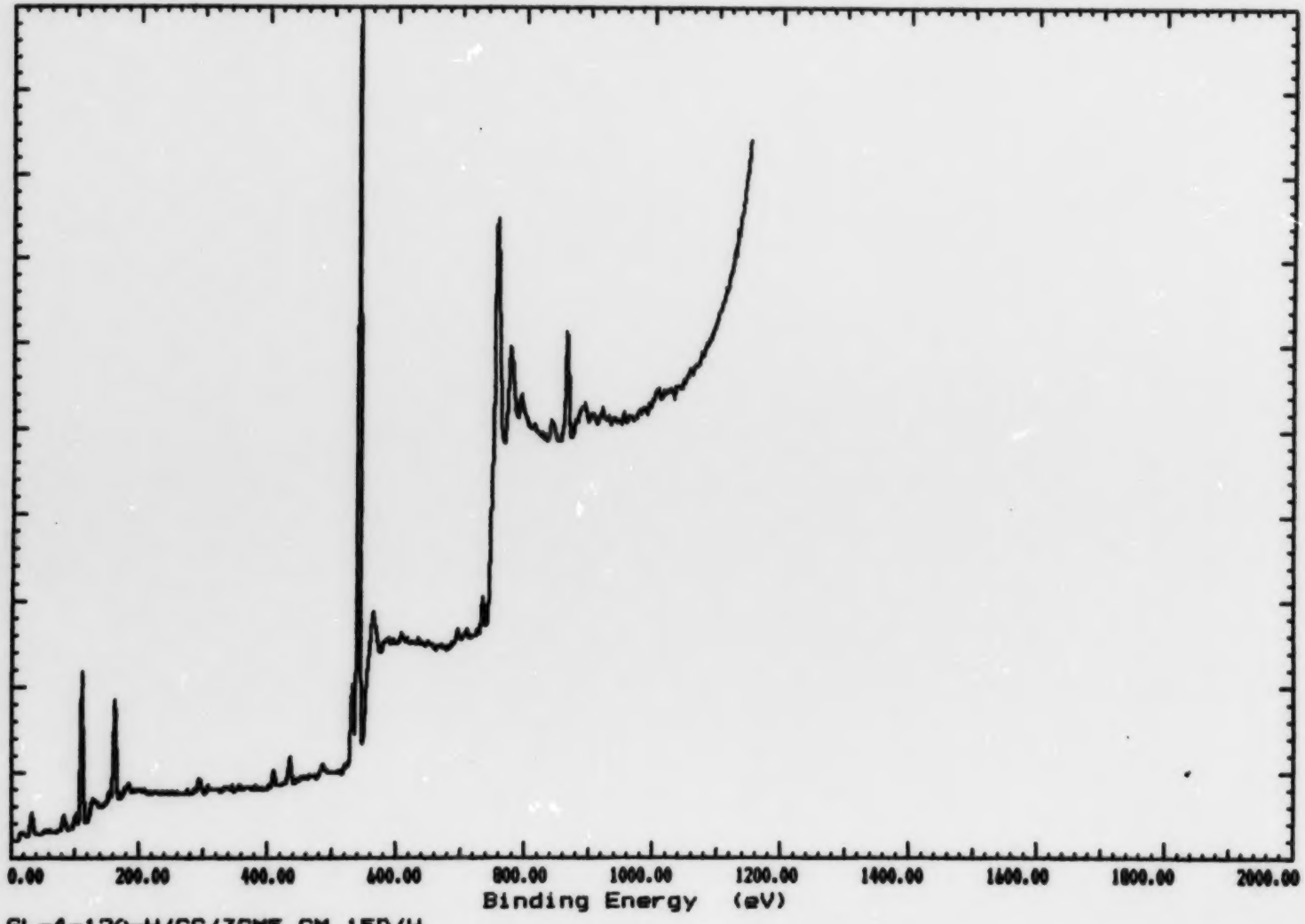
HZSM-5 Sample B

HZSM-5 Sample B

CALCINED

ASA6 Region 1 SURVEY VG SCIENTIFIC

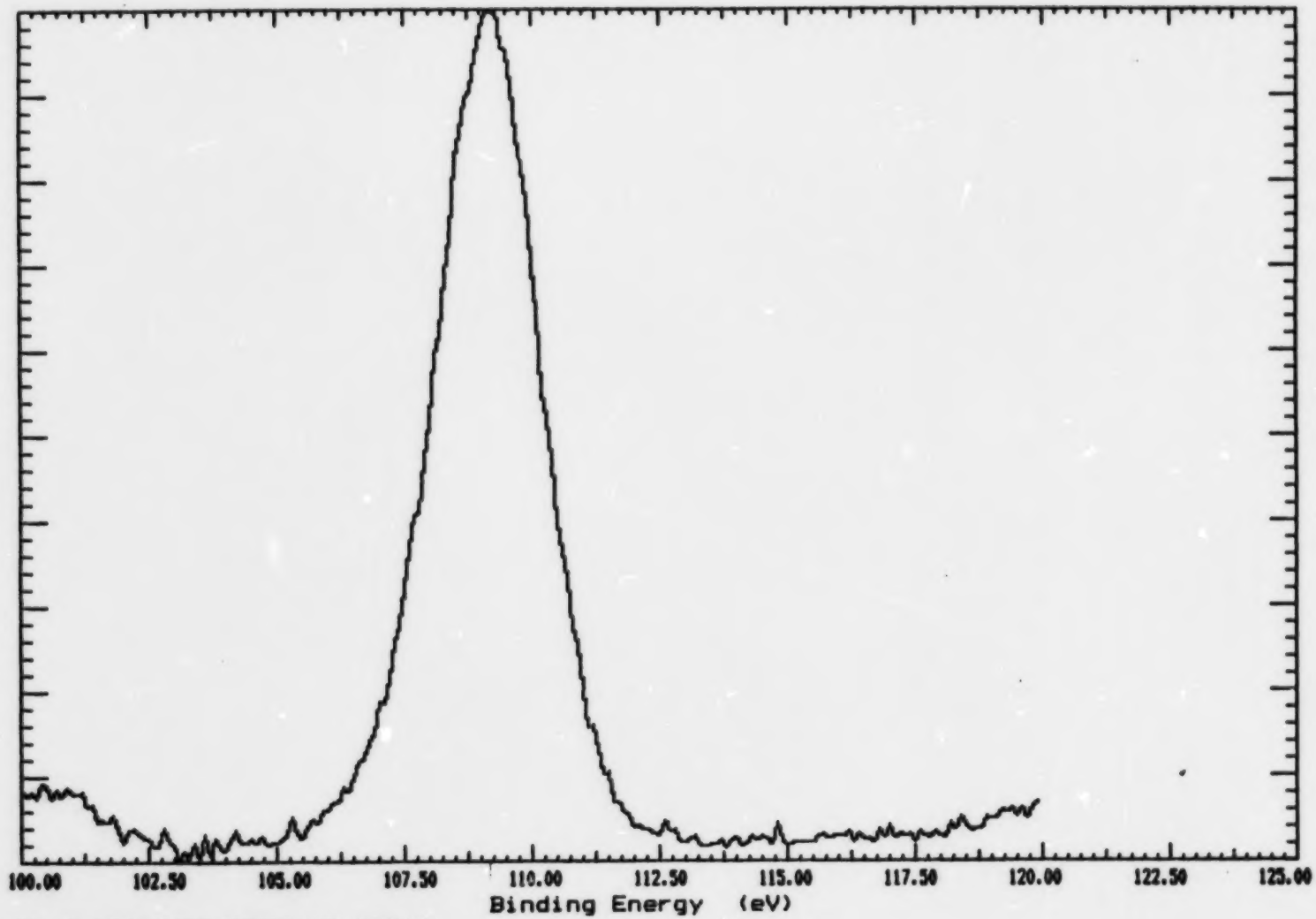
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 93439
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-4-120-H/CS/ZSM5 CM 15D/H
MG300 NR
24 NOV.89 16H00

ASA6 Region 2 SI2P VG SCIENTIFIC

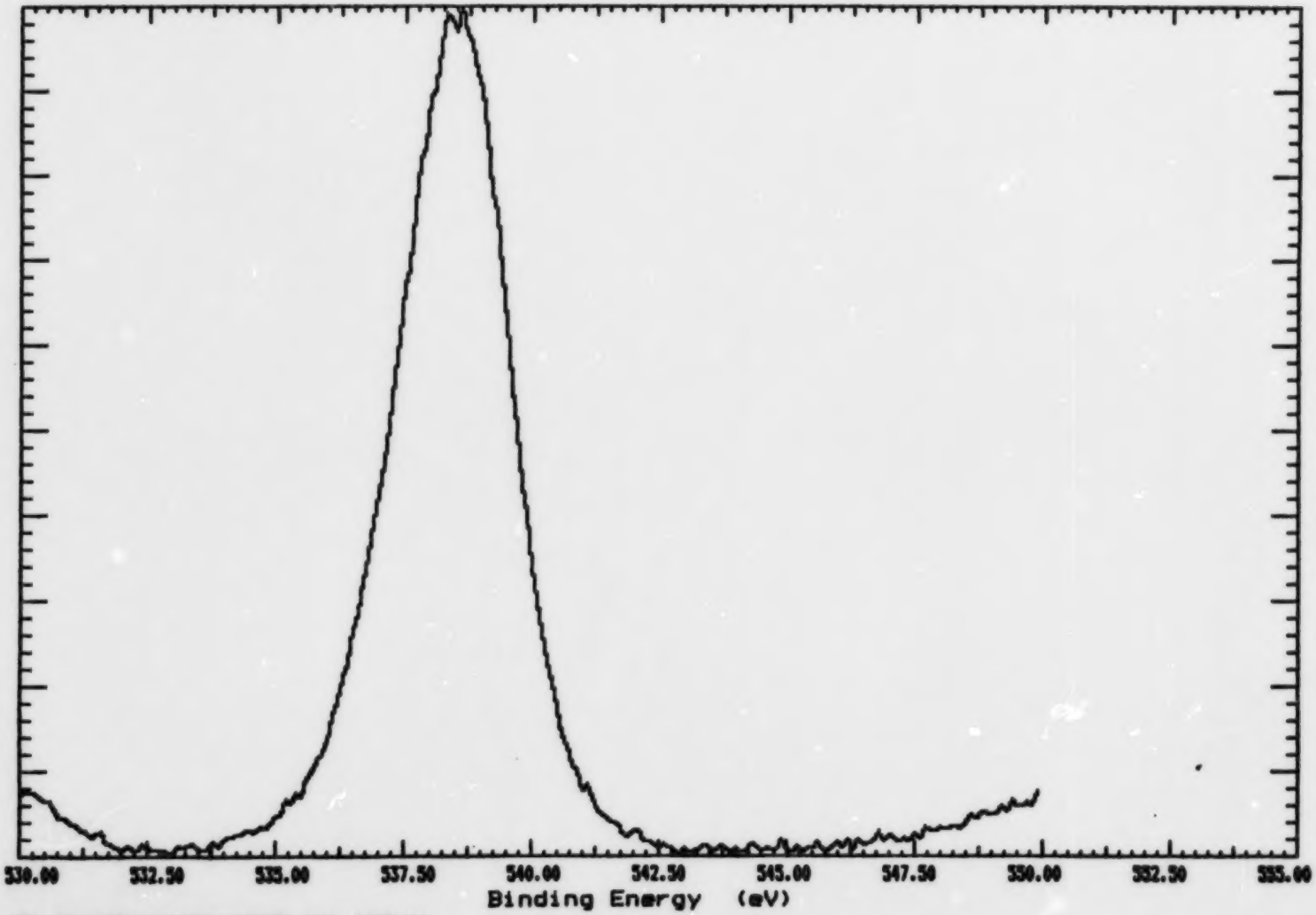
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3969
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-120-H/C6/ZSM5 CM 15D/H
MG300 NR
24 NOV.89 16H00

ASA6 Region 3 O1S VG SCIENTIFIC

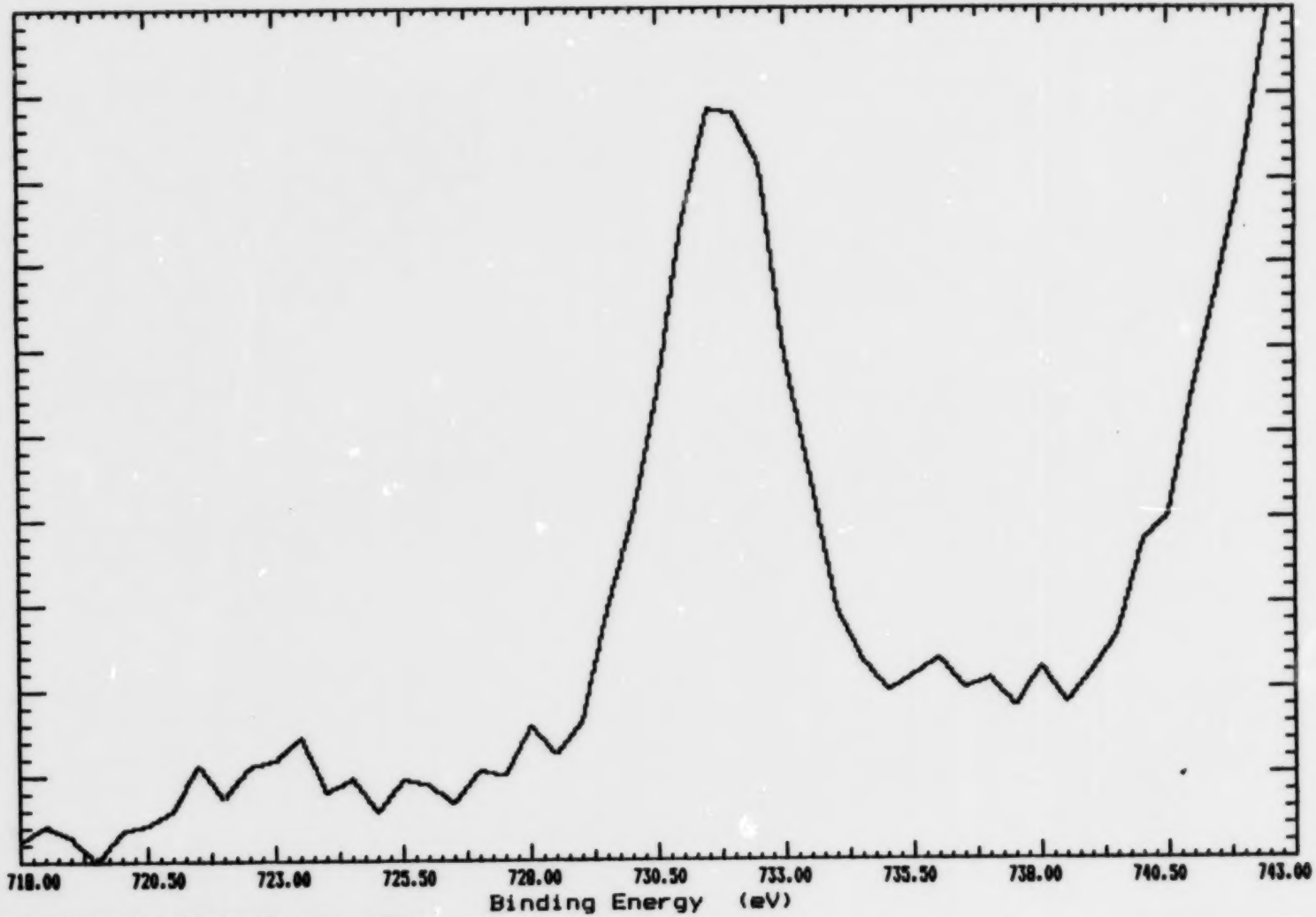
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 21526
Step Size = 0.10 eV. 6 Scans of 200 channels at 50 ms per chan



GL-4-120-H/CS/ZSM5 CM 15D/H
MG300 NR
24 NOV.89 16H00

ASA6 Region 5 CS3D VG SCIENTIFIC

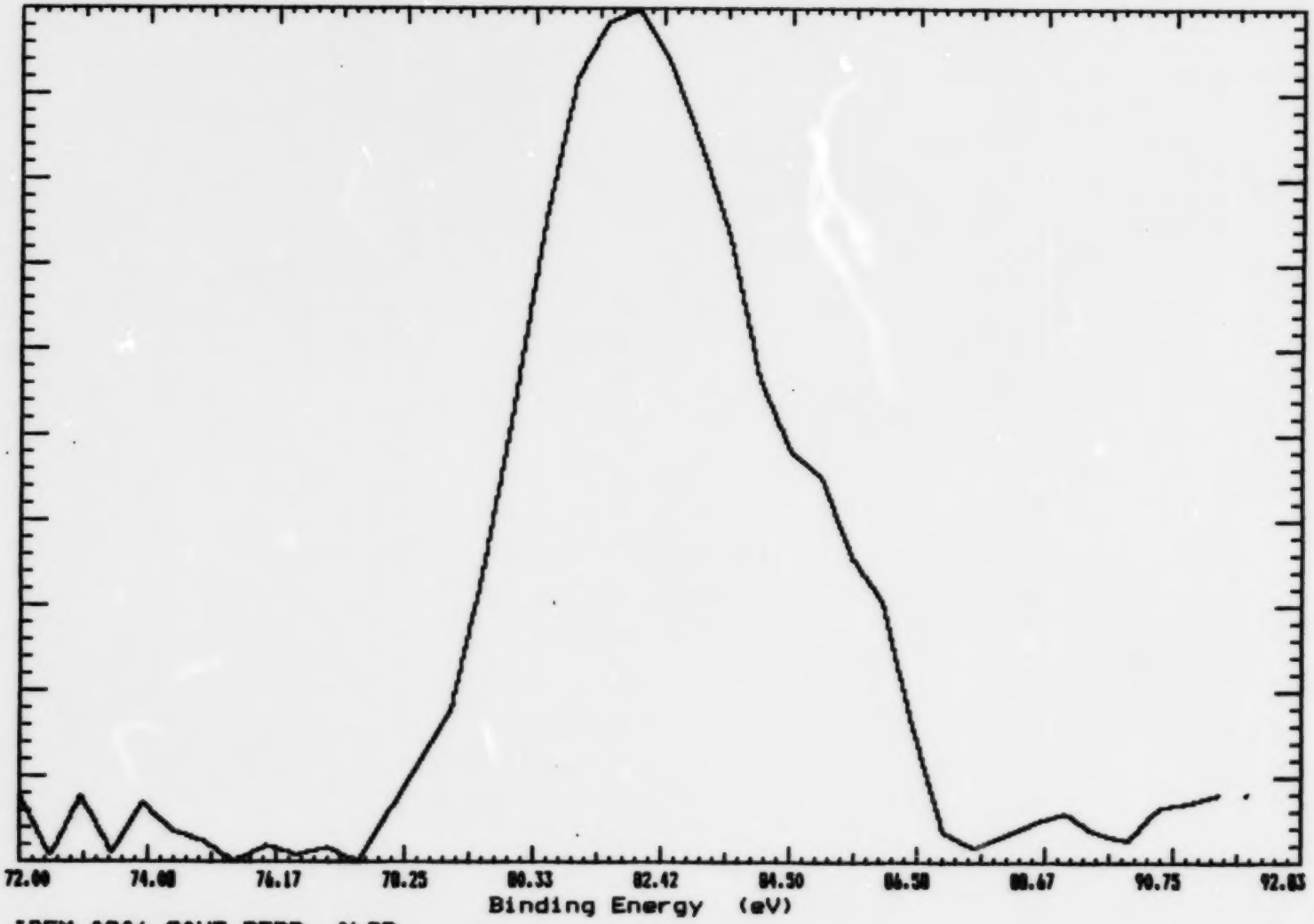
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 5802
Step Size = 0.50 eV. 30 Scans of 50 channels at 50 ms per chan



GL-4-120-H/CS/ZSM5 CM 15D/H
MG300 NR
24 NOV.89 16H00

ASA6A Region 1 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 1679
Step Size = 0.50 eV. 70 Scans of 40 channels at 50 ms per chan



IDEM ASA6 SAUF REPR. AL2P
MMES CONDS.
24 NOV.89 14H25

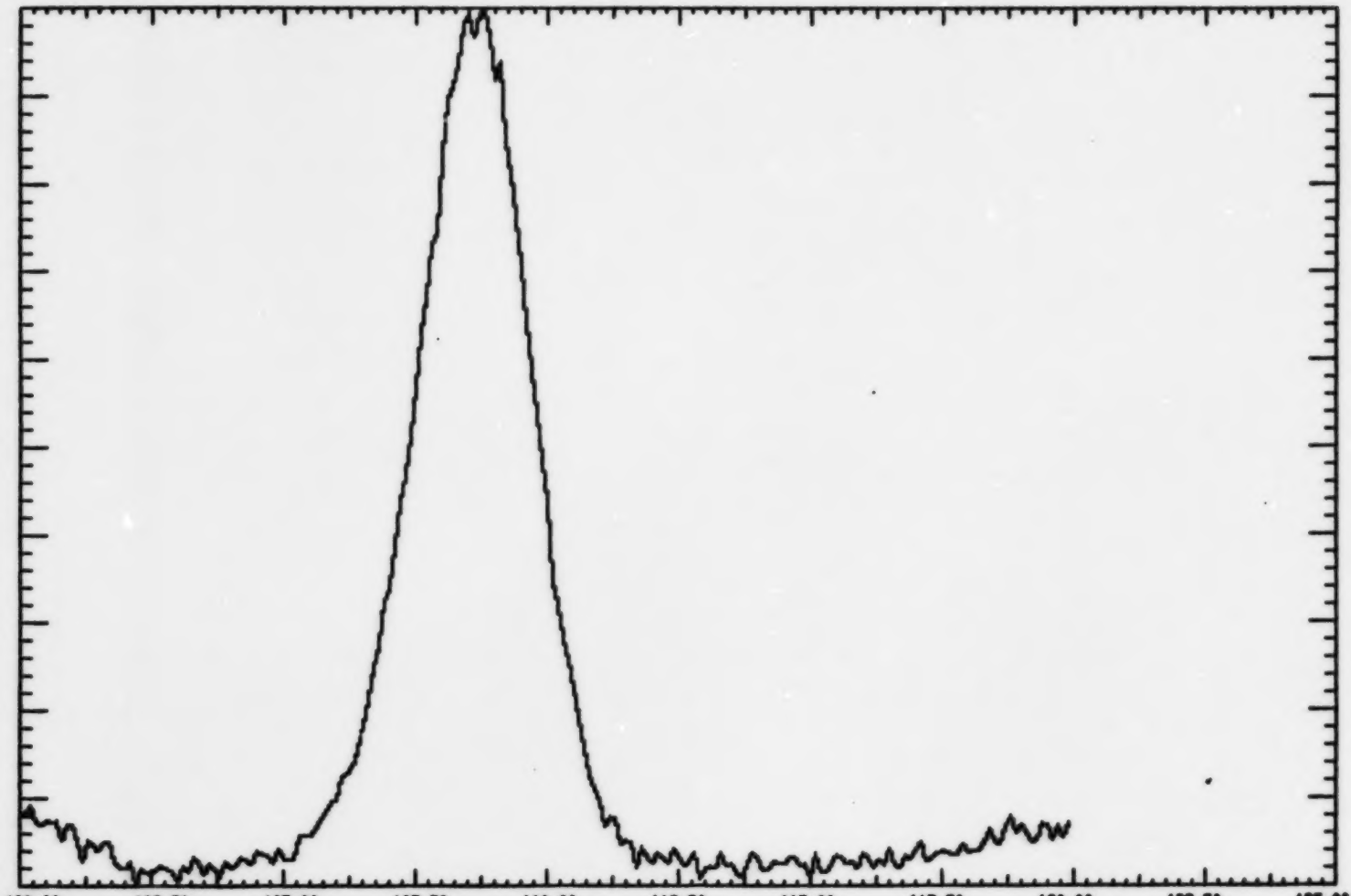
HZSM-5 Sample B

CALCINED

Reproducibility test

ASA9 Region 1 SI2P VG SCIENTIFIC

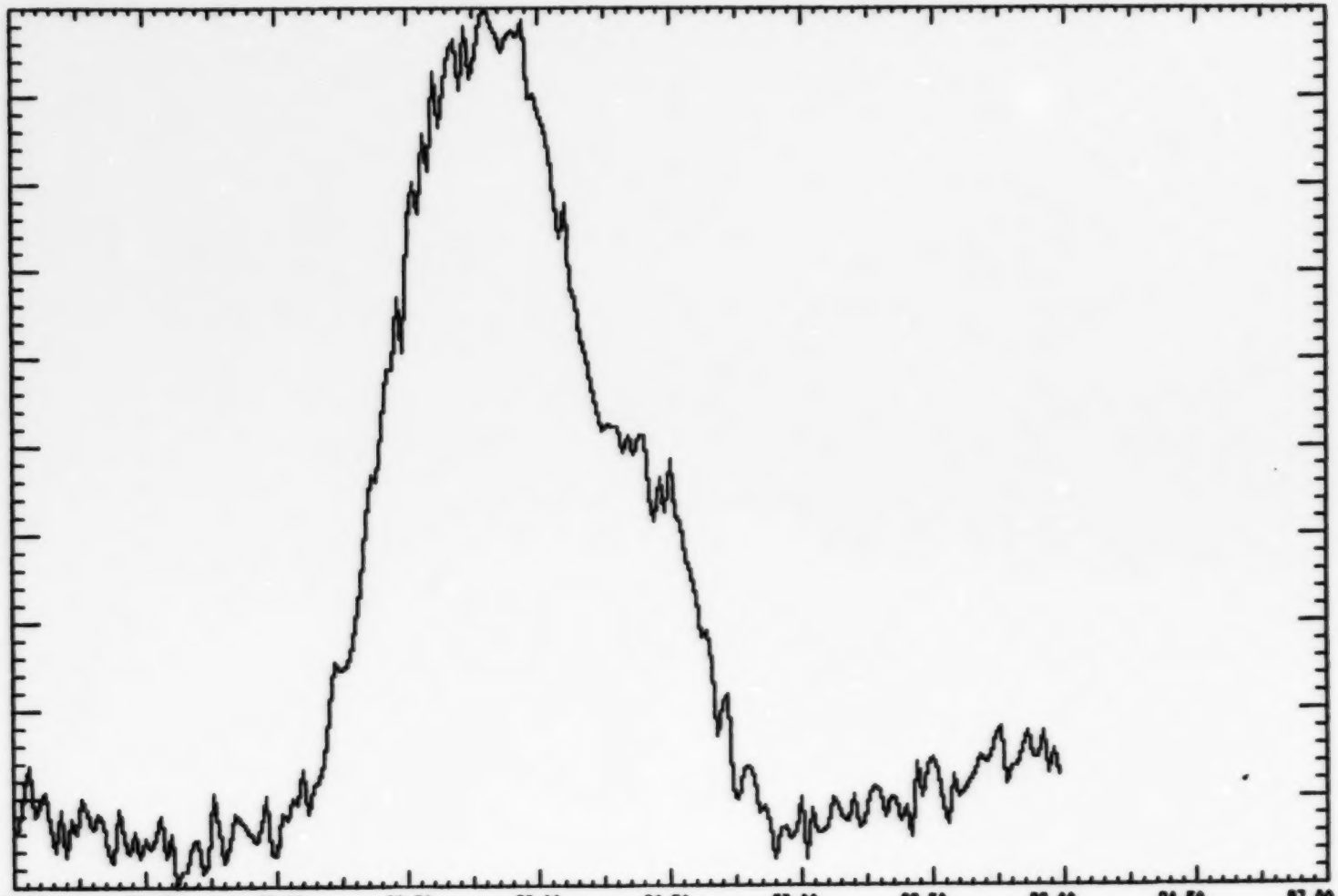
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2893
Step Size = 0.10 eV. 25 Scans of 200 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

ASA9 Region 2 AL2P-CS VG SCIENTIFIC

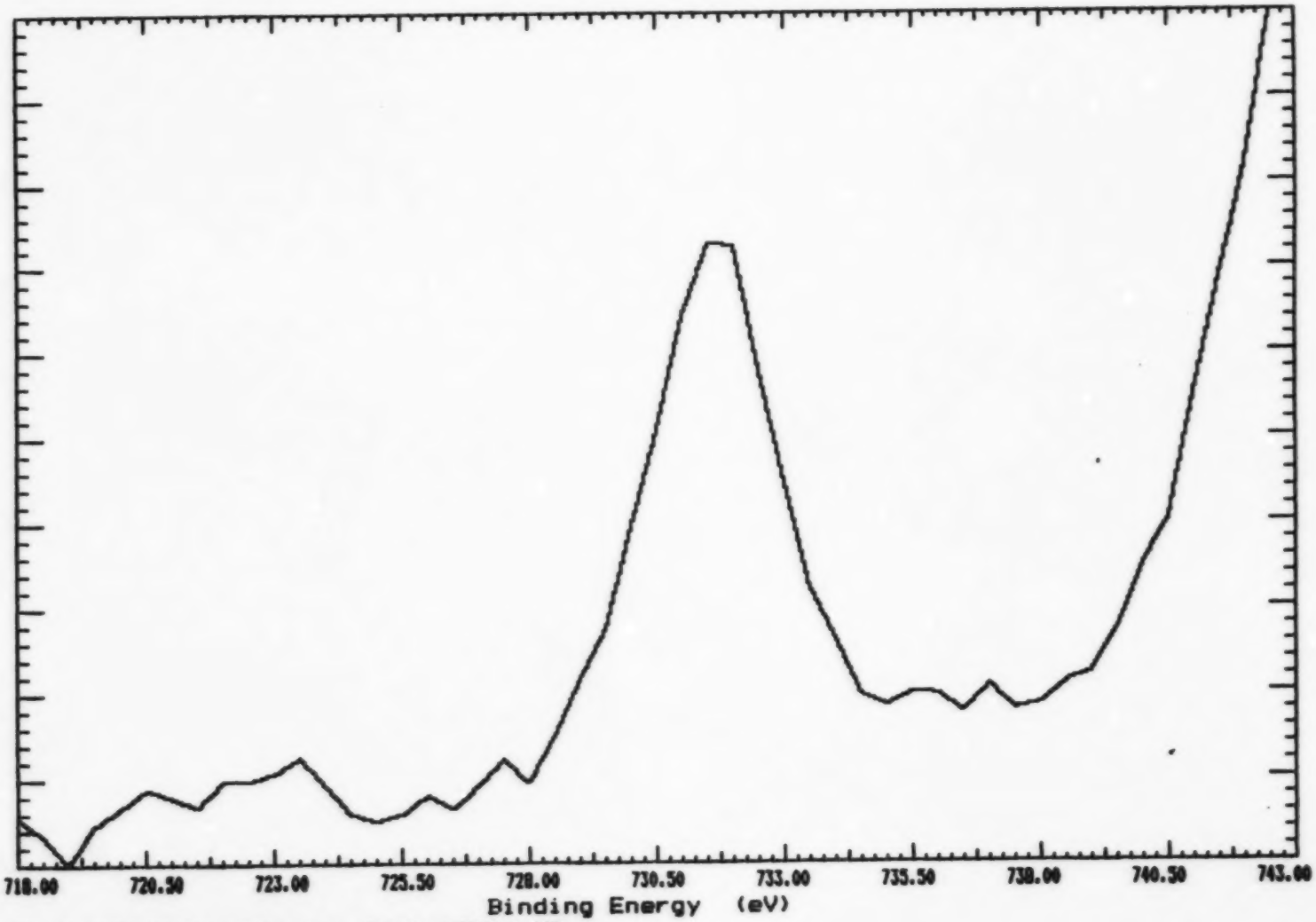
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 276
Step Size = 0.10 eV. 255 Scans of 200 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

ASA9 Region 3 CS3D VG SCIENTIFIC

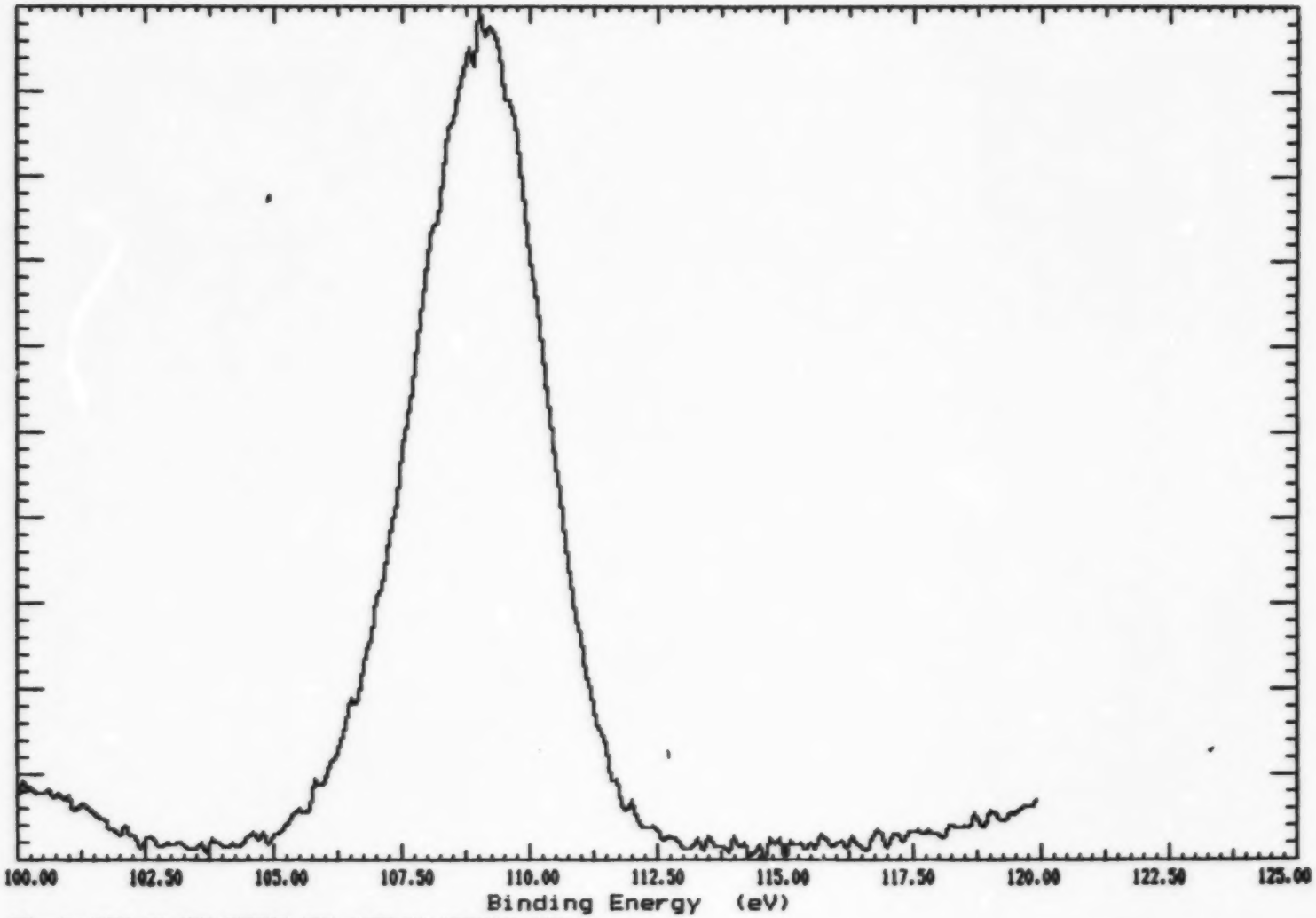
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 5437
Step Size = 0.50 eV. 60 Scans of 50 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

ASA9 Region 4 SI2P VG SCIENTIFIC

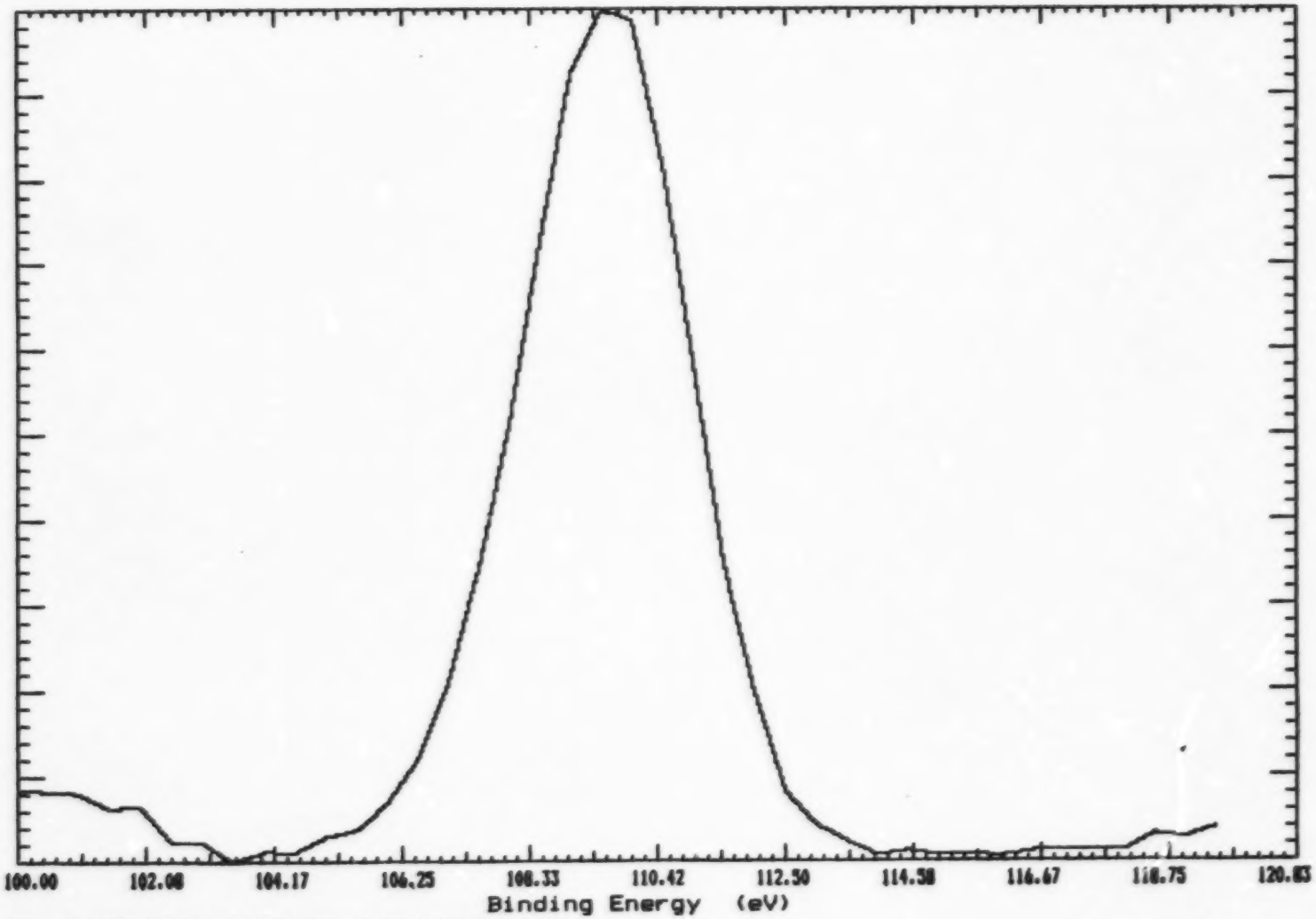
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2654
Step Size = 0.10 eV. 50 Scans of 200 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

ASA9 Region 5 SI2P VG SCIENTIFIC

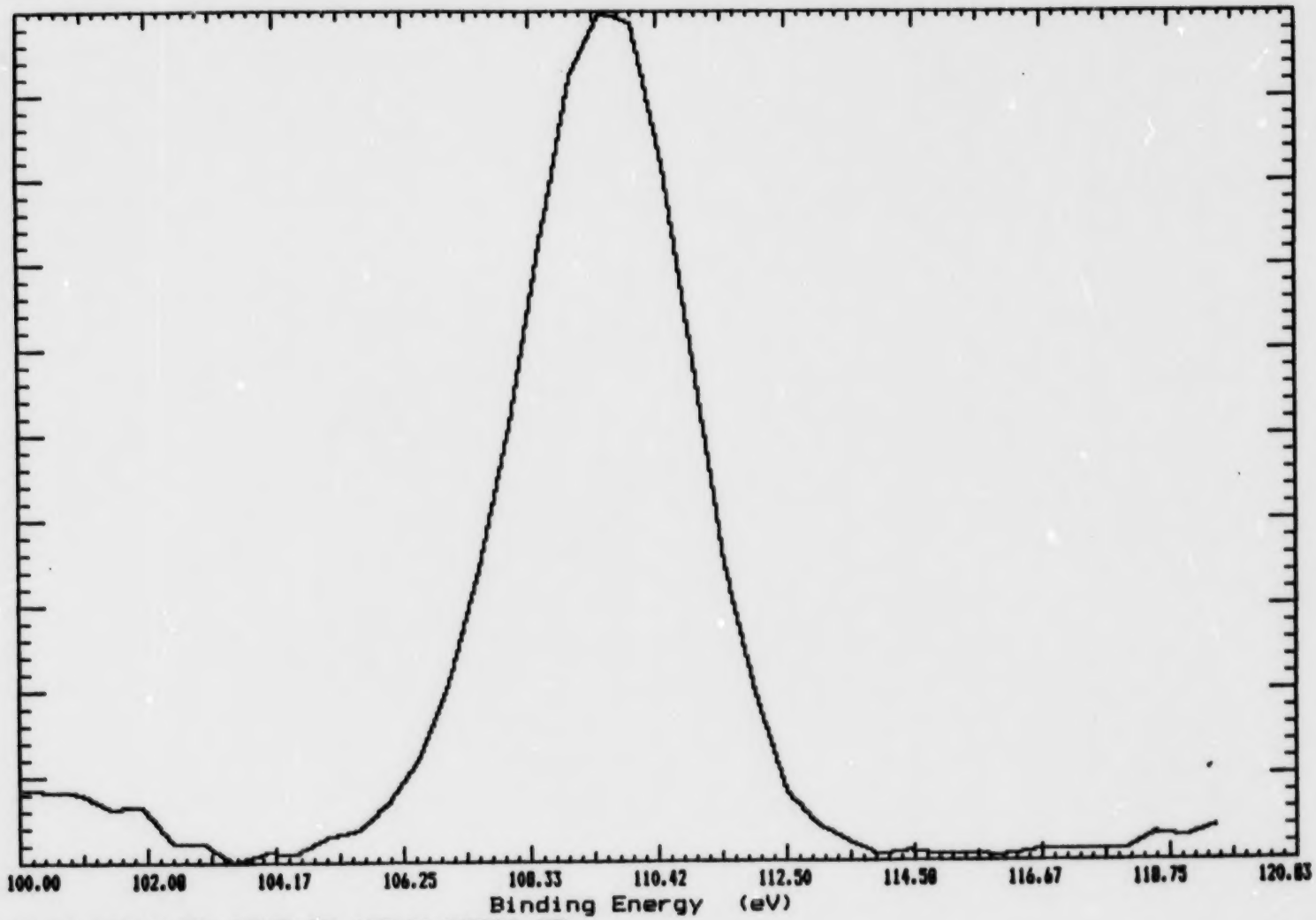
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 11285
Step Size = 0.50 eV. 20 Scans of 40 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

ASA9 Region 5 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 11285
Step Size = 0.50 eV. 20 Scans of 40 channels at 50 ms per chan



GL-4-120-H-CS-ZSM5 CM 15D/H MG300 NR
OPT SI2P+MECA
11H20 27NOV 89

NiO-Alumina

Sample No. 182 (3.36% Ni)

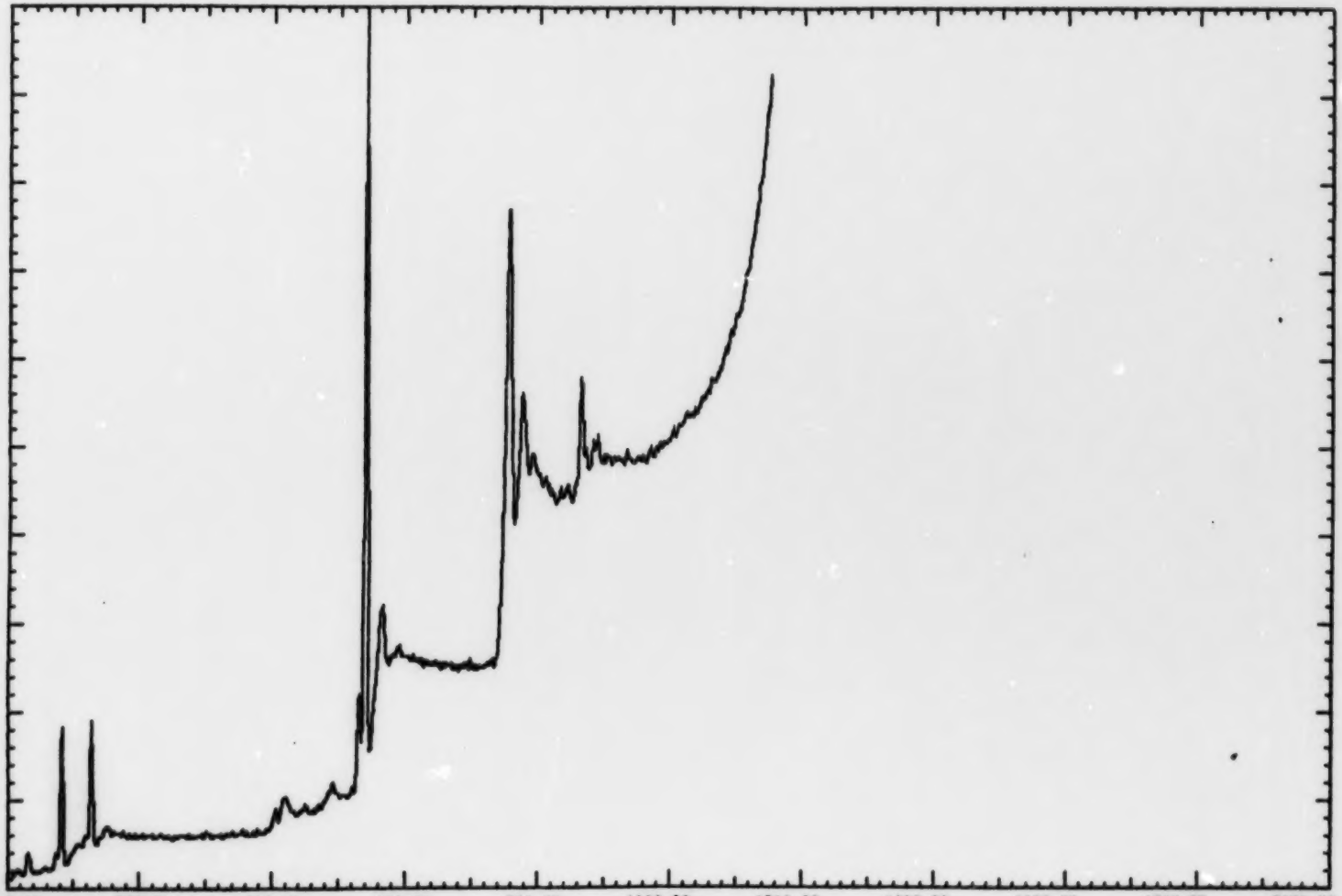
NiO-Alumina

Sample No. 182 (3.36% Ni)

CALCINED

ASA34 Region 1 SURVEY VG SCIENTIFIC

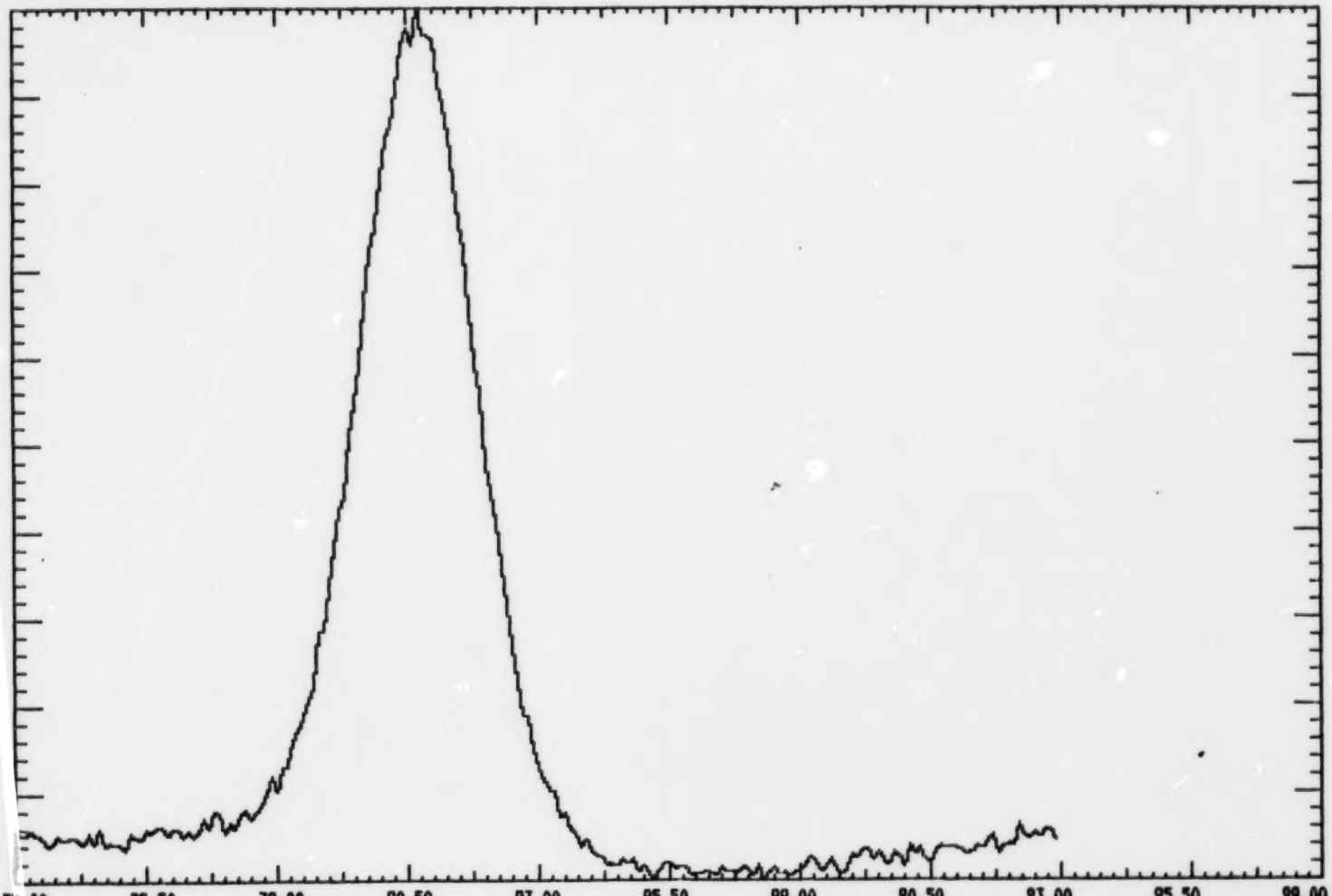
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 70263
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H45 28 MARS 90 V=5*10-8

ASA34 Region 2 AL2P VG SCIENTIFIC

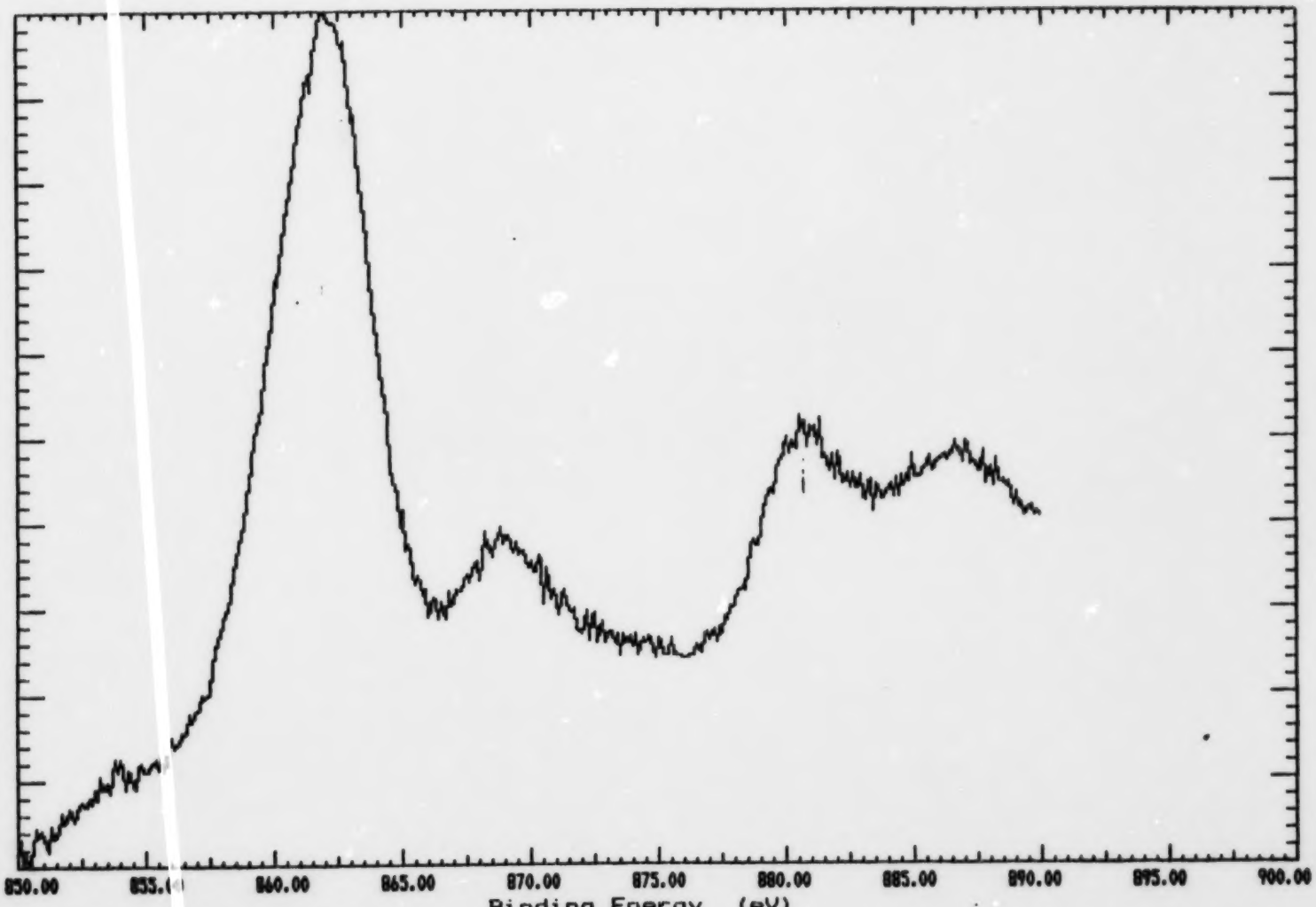
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2364
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9:45 28 MARS 90 V=5*10-8

ASA 34 Region 3 NI2P VG SCIENTIFIC

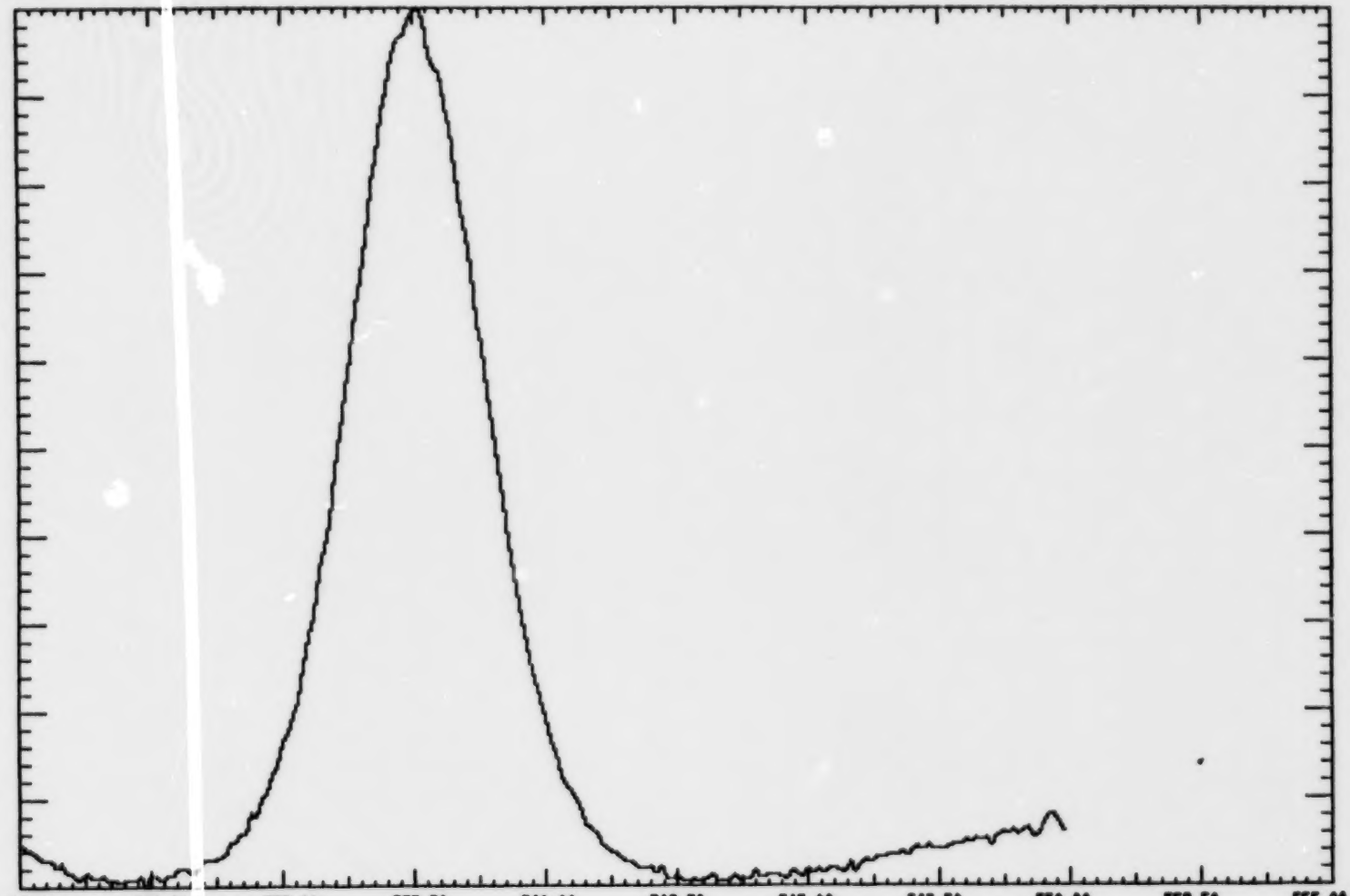
Mg XP: Analyser Energy = 20 eV Max Plotted Count Rate = 2559
Step Size = 0.10 eV. 251 Scans of 400 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H45 28 MAR 90 V=5*10-8

ASA34 Region 4 01S VG SCIENTIFIC

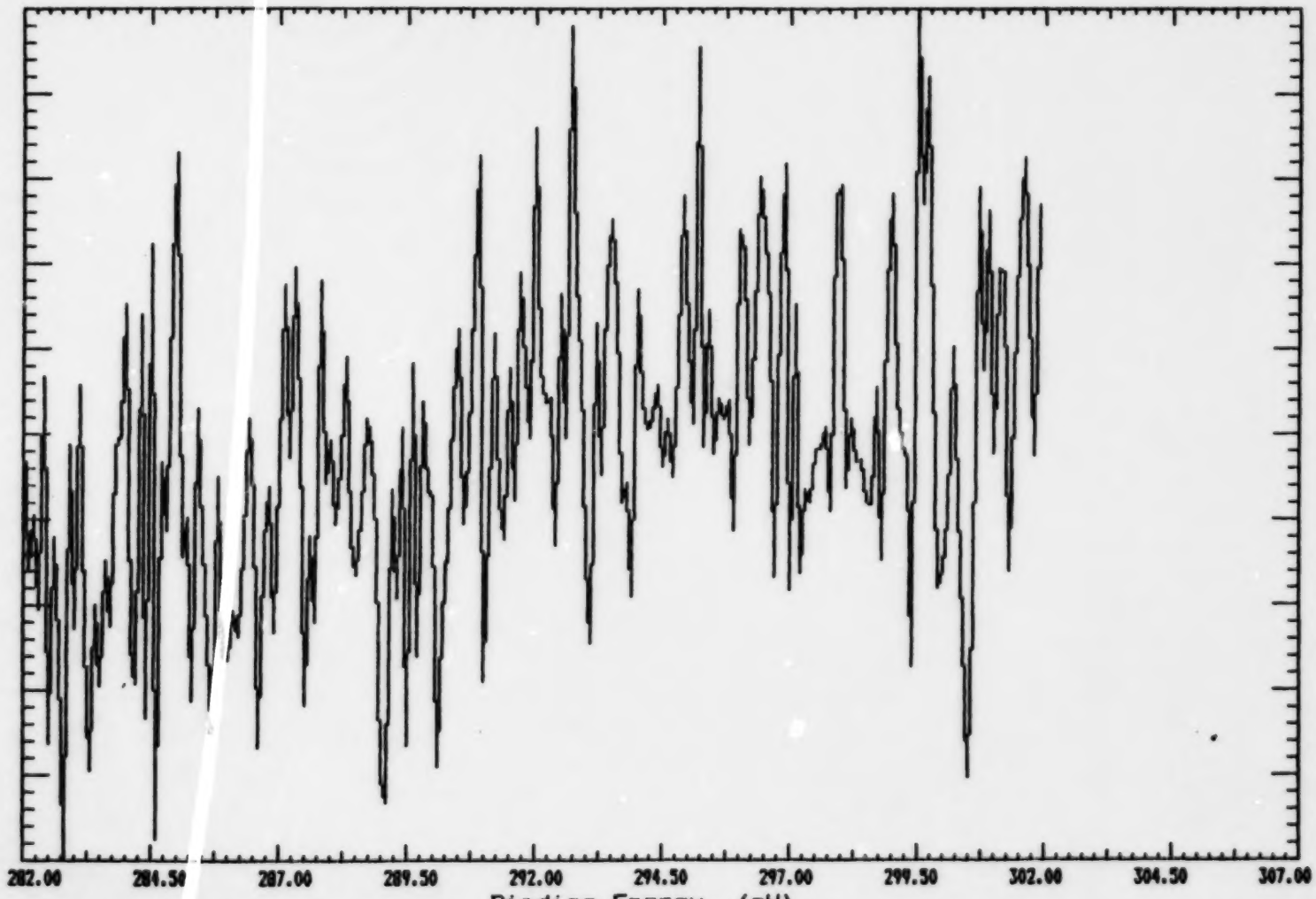
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 15533
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H45 28 MARS 90 V=5*10-8

ASA34 Region 5 C1S VG SCIENTIFIC

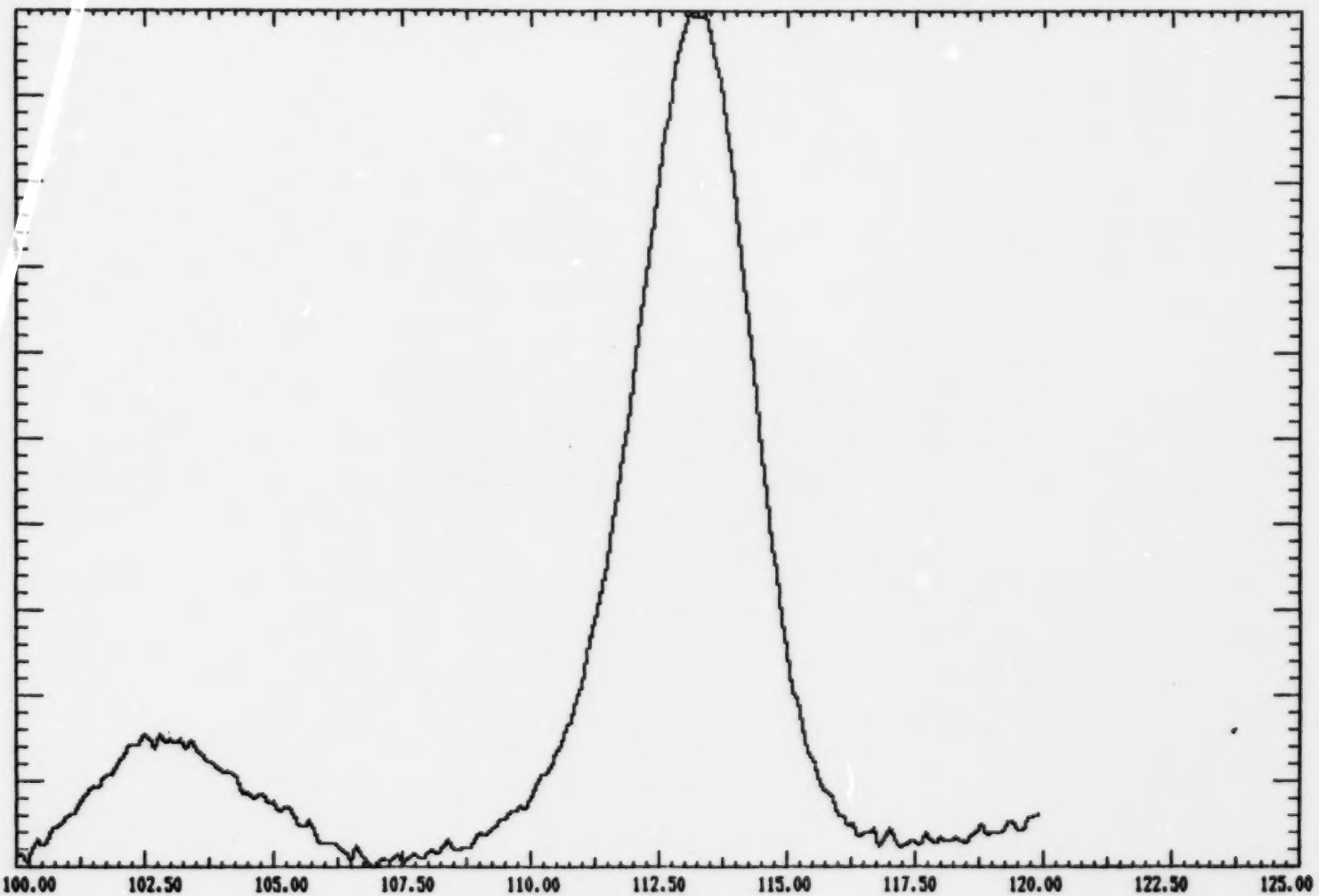
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 95
Step Size = 0.10 eV. 81 Scans of 200 channels at 50 ms per chan



GL-4-182 CM 15D/H M8300 C1 NR
OPT AL2P+ME CA
9H45 28 MA S 90 V=5*10-8

ASA 34 Region 6 SI2P VG SCIENTIFIC

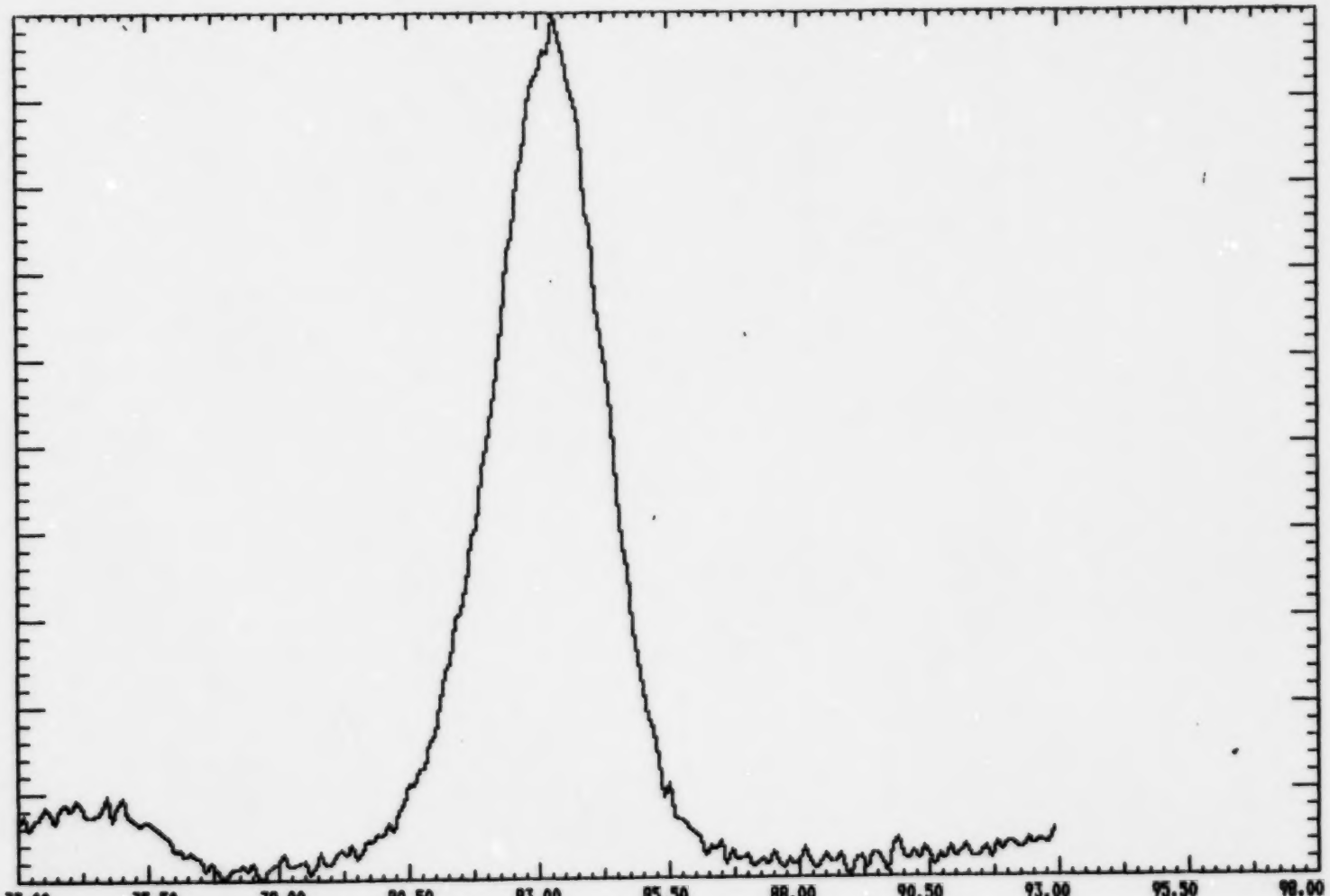
Mg X-S Analyser Energy = 20 eV Max Plotted Count Rate = 29446
Step Size = 0.10 eV. 26 Scans of 200 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H45 28 MARS 90 V=5*10-8

ASA34 Region 7 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3175
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-182 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H45 28 MARS 90 V=5*10-8

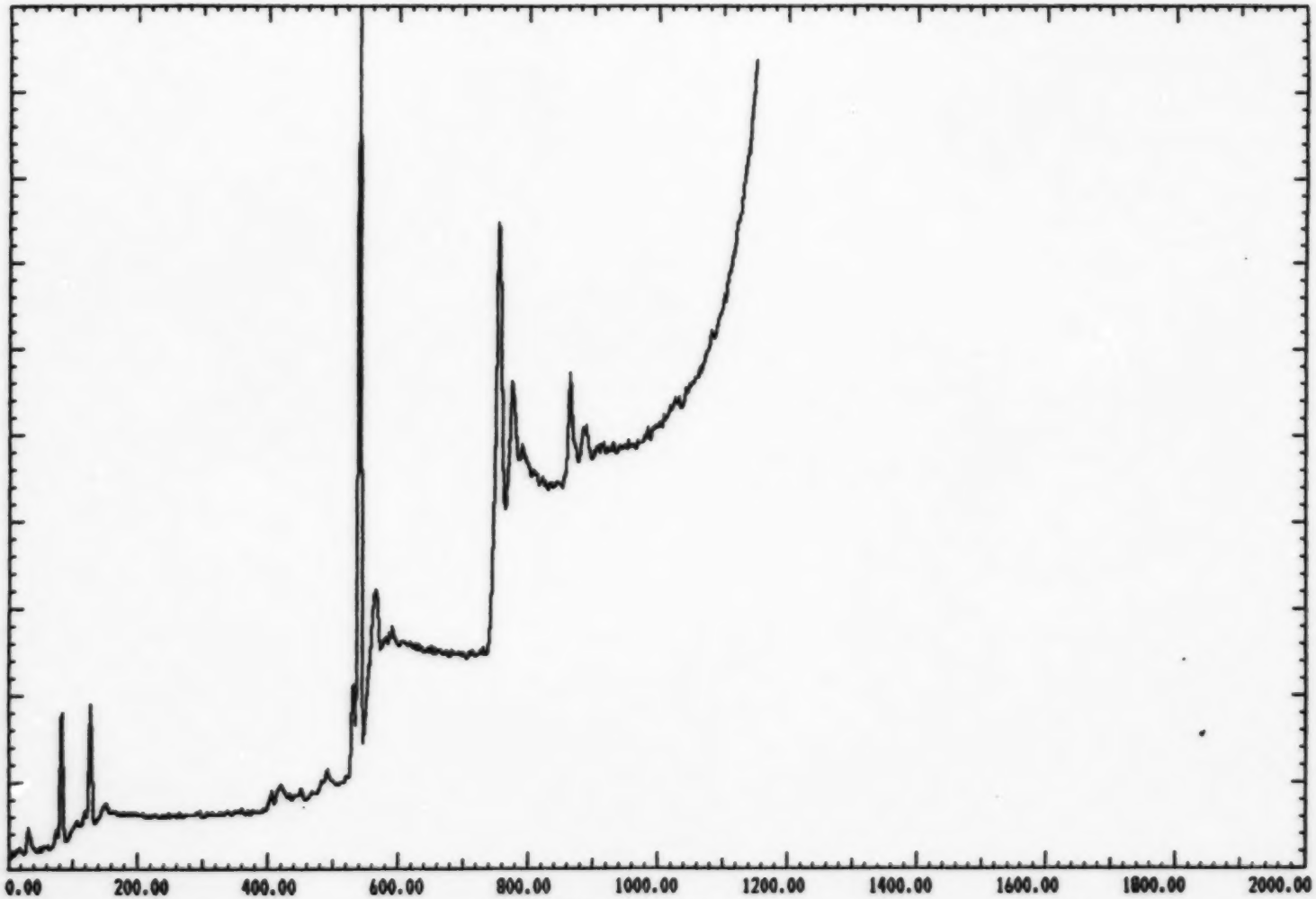
NiO-Alumina

Sample No. 182 (3.36% Ni)

CALCINED AND GROUND

ASA35 Region 1 SURVEY VG SCIENTIFIC

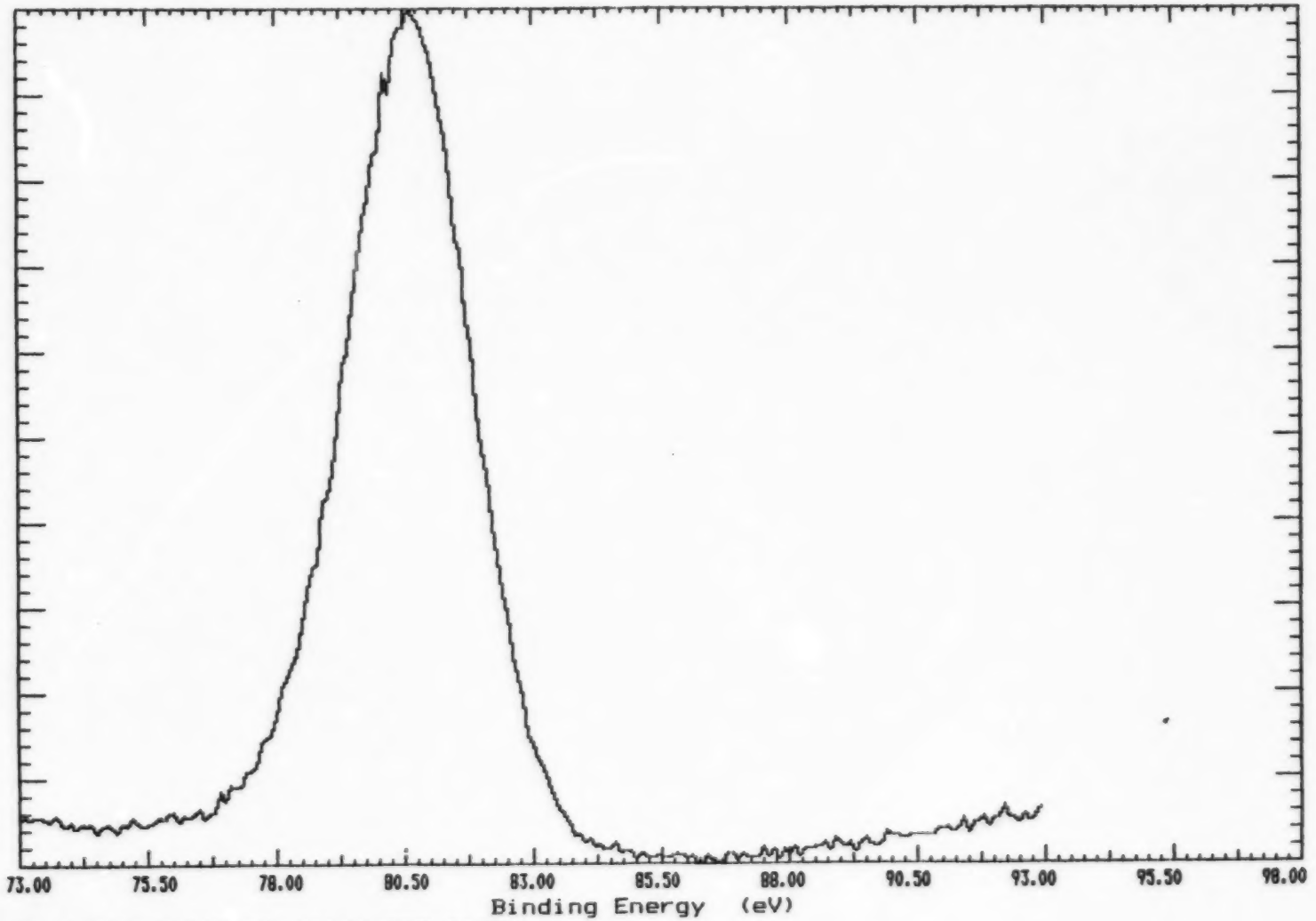
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 89755
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

ASA35 Region 2 AL2P VG SCIENTIFIC

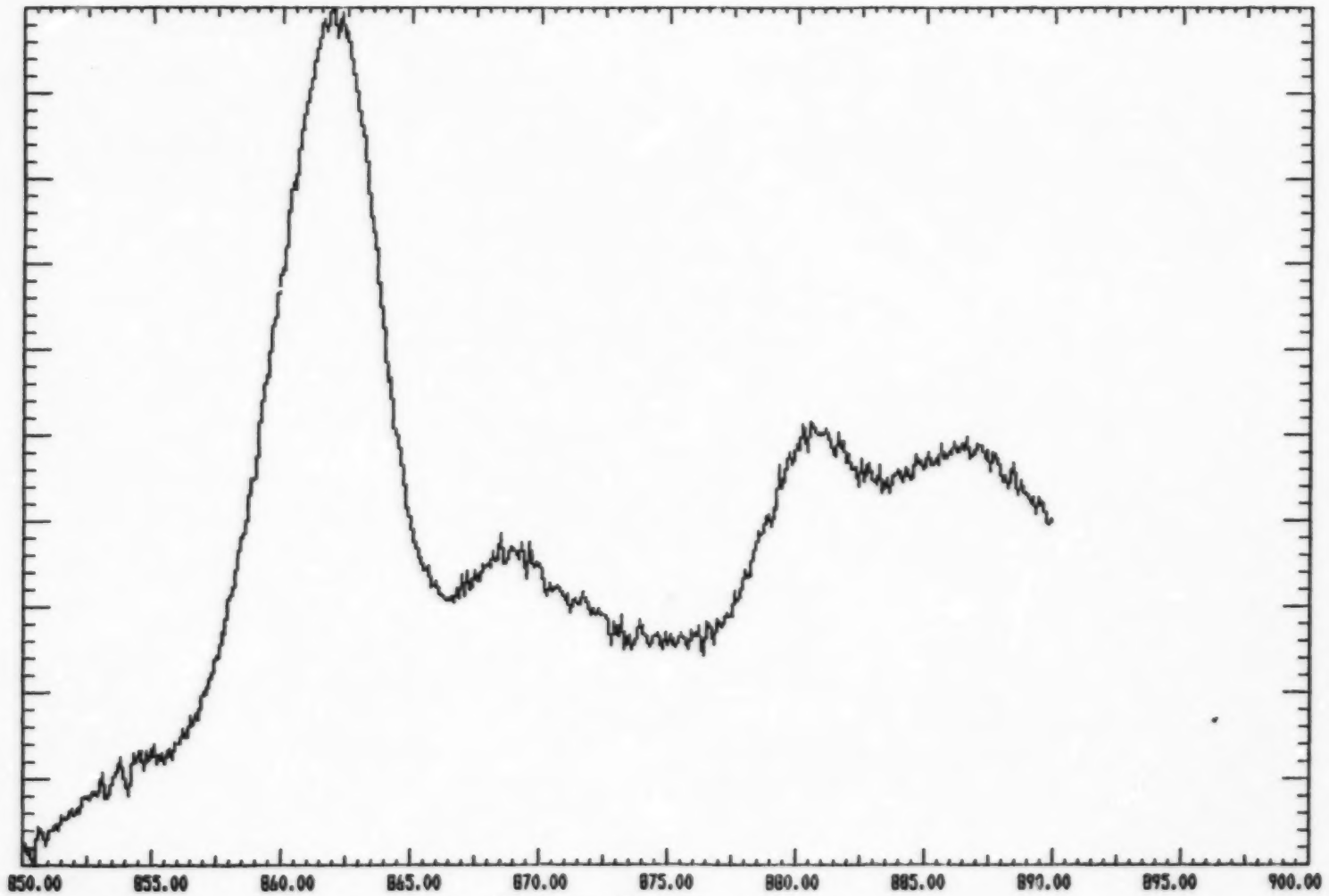
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2881
Step Size = 0.10 eV. 54 Scans of 200 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

ASA35 Region 3 NI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2791
Step Size = 0.10 eV. 255 Scans of 400 channels at 50 ms per chan

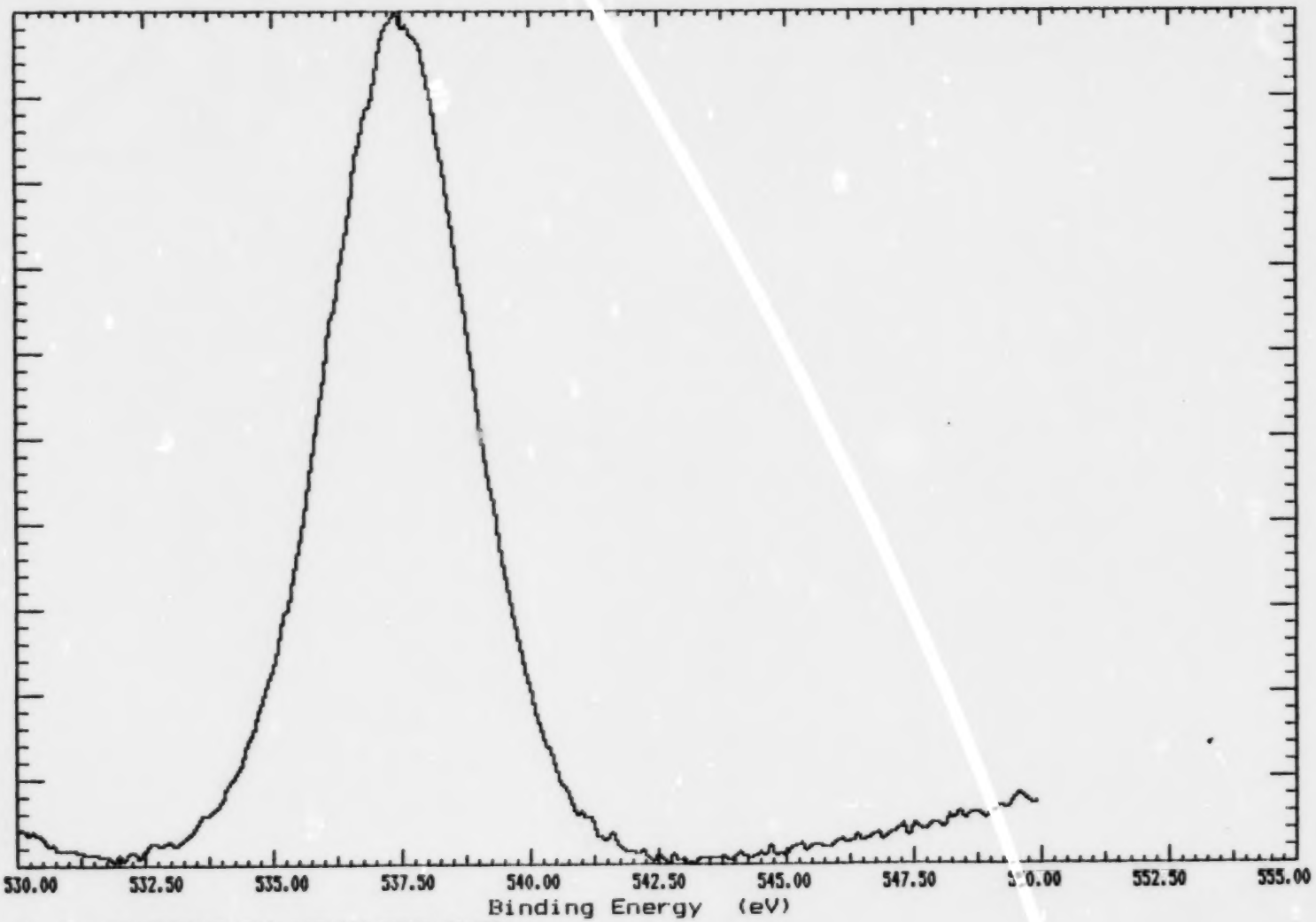


GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

50

ASA35 Region 4 01S VG SCIENTIFIC

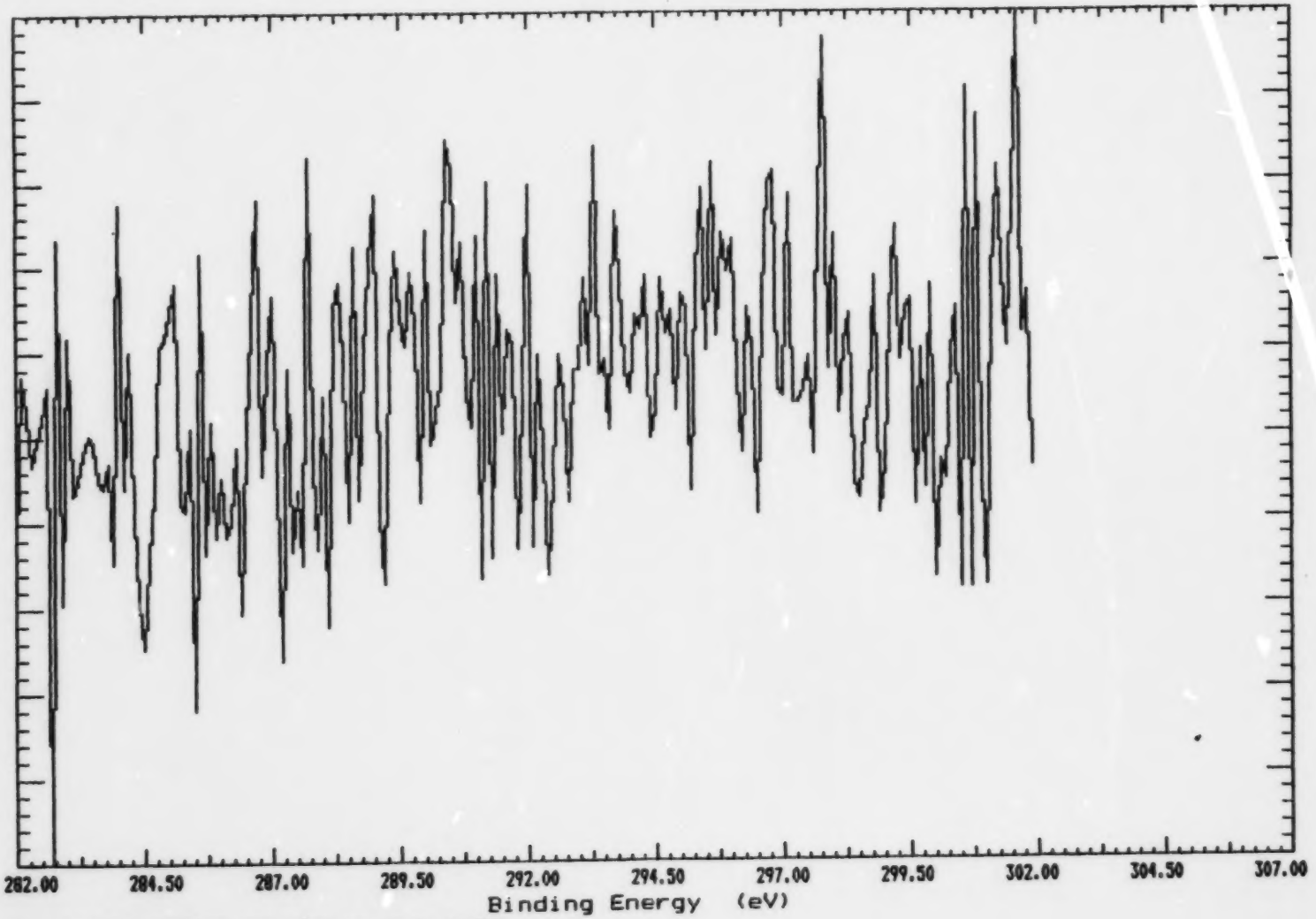
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 17866
Step Size = 0.10 eV. 12 Scans of 2.0 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

ASA35 Region 5 C1S VG SCIENTIFIC

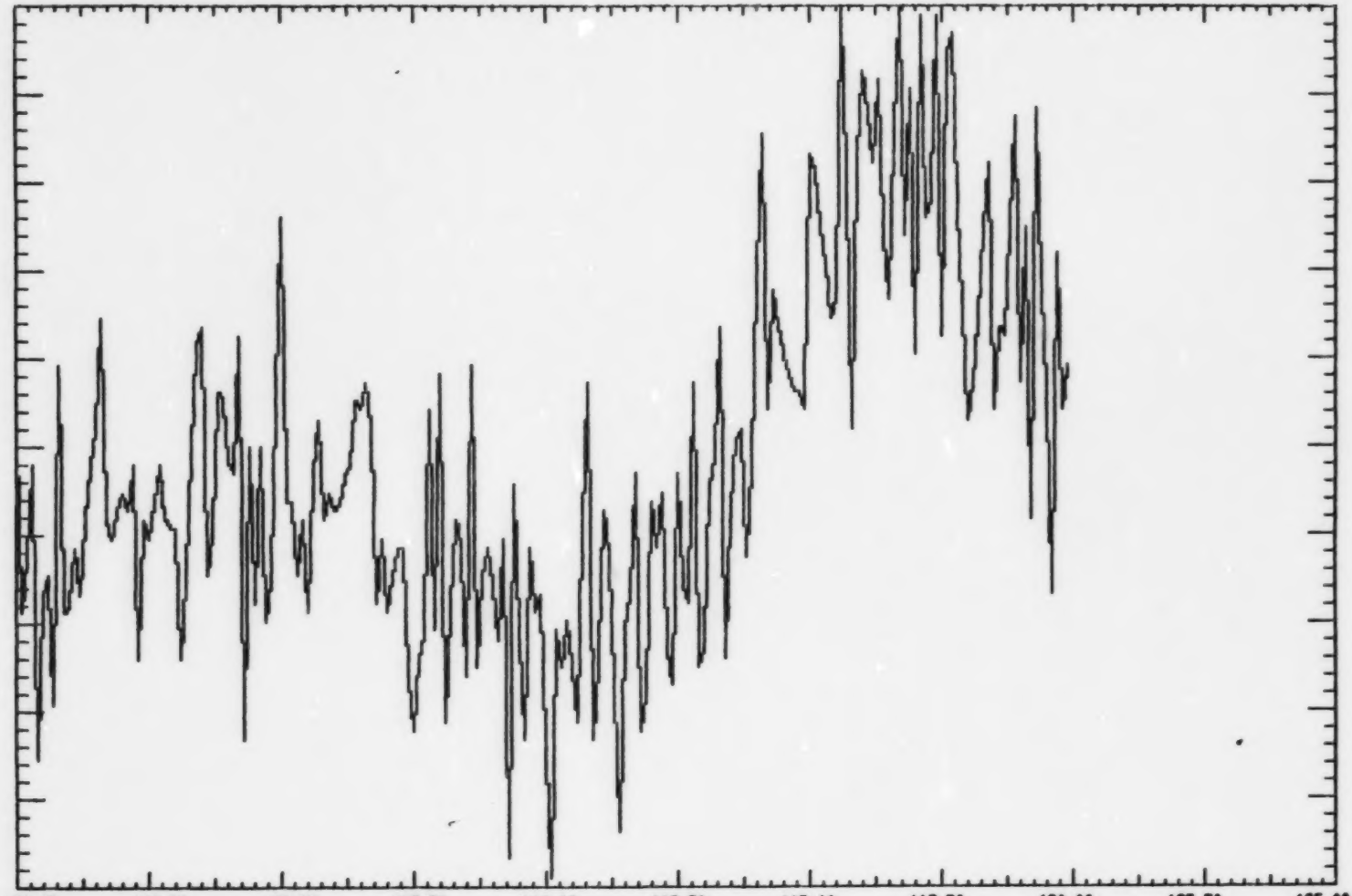
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 149
Step Size = 0.10 eV. 44 Scans of 200 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

ASA35 Region 6 SI2P VG SCIENTIFIC

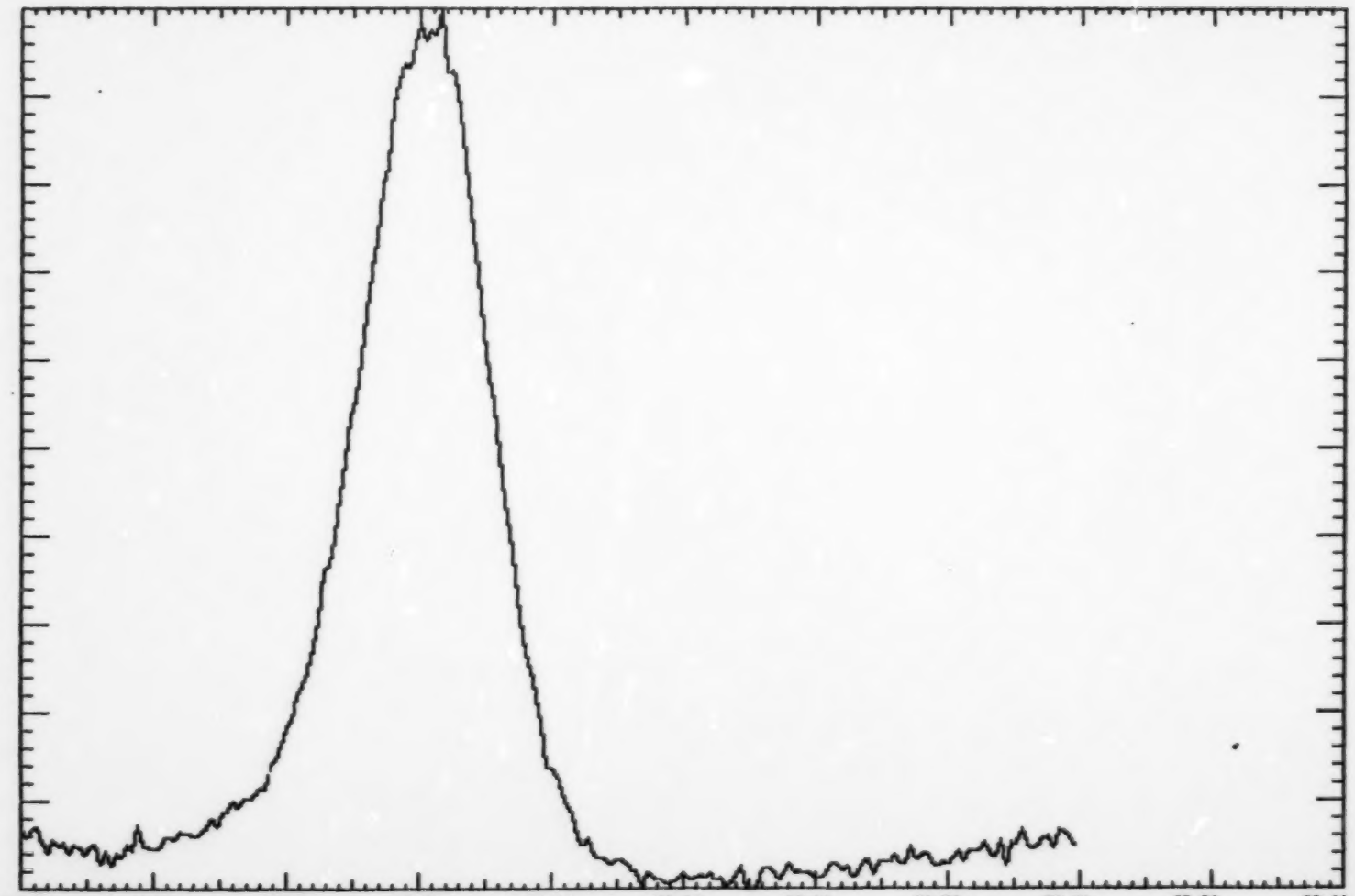
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 640
Step Size = 0.10 eV. 3 Scans of 200 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

ASA35 Region 7 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2922
Step Size = 0.10 eV. 22 Scans of 200 channels at 50 ms per chan



GL-4-182-BROYE CM 15D/H OPT.AL2P
MG300W NR C1
27 MARS 90 12H30

Molybdena-Alumina

Sample No. 182 (9.30% Mo)

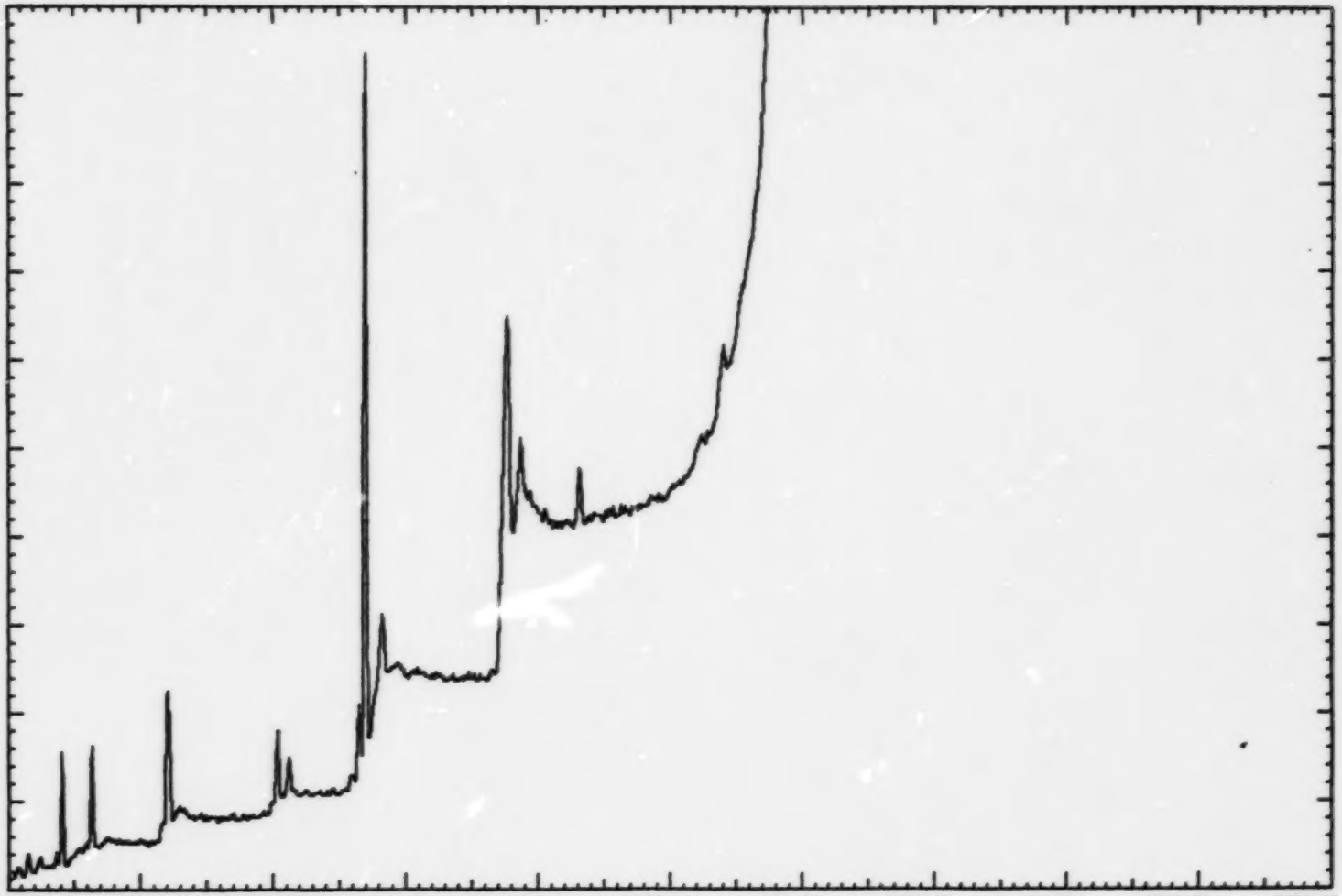
Molybdena-Alumina

Sample No. 182 (9.30% Mo)

CALCINED

ASA36 Region 1 SURVEY VG SCIENTIFIC

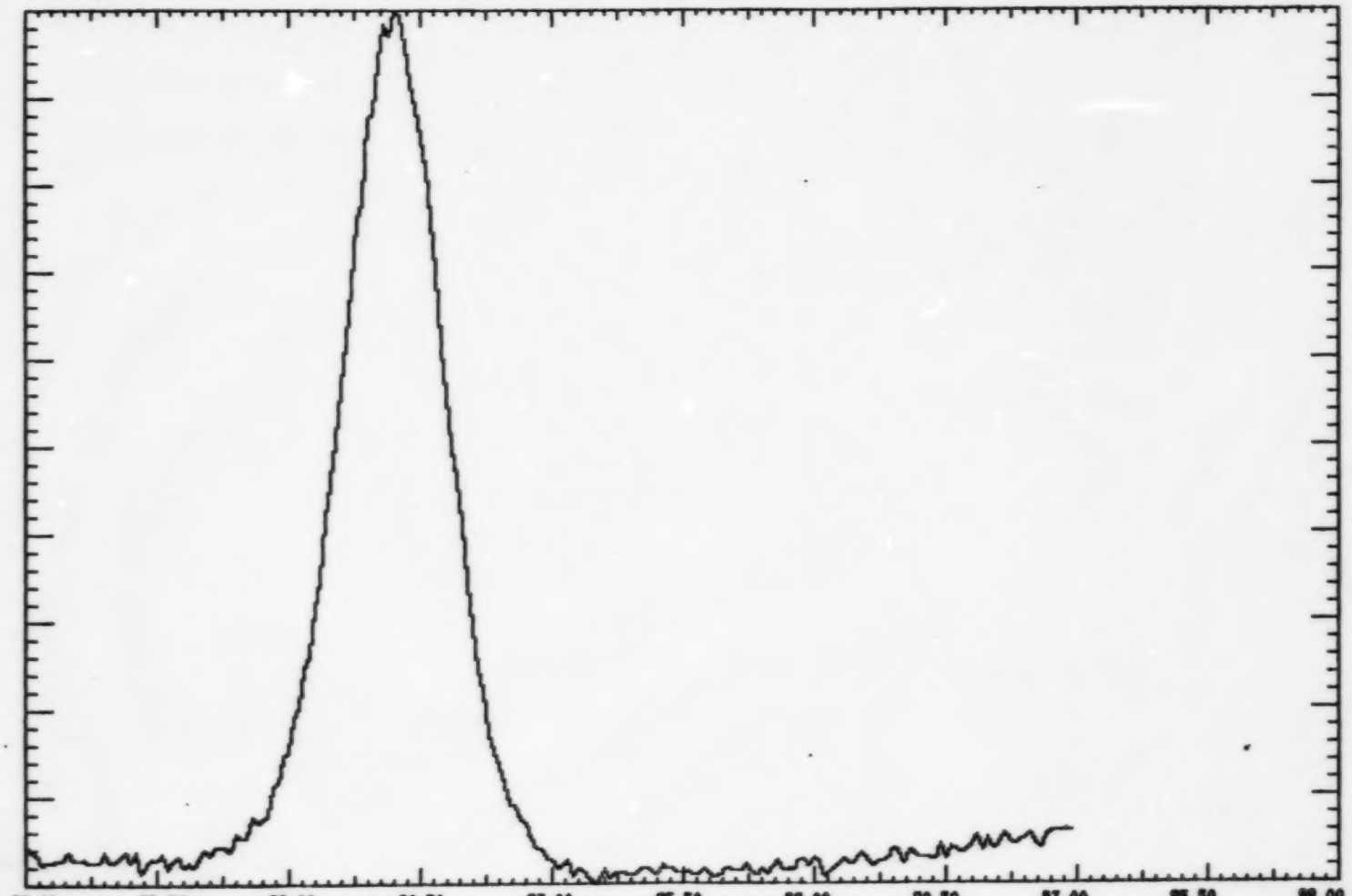
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 83991
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

ASA36 Region 2 AL2P VG SCIENTIFIC

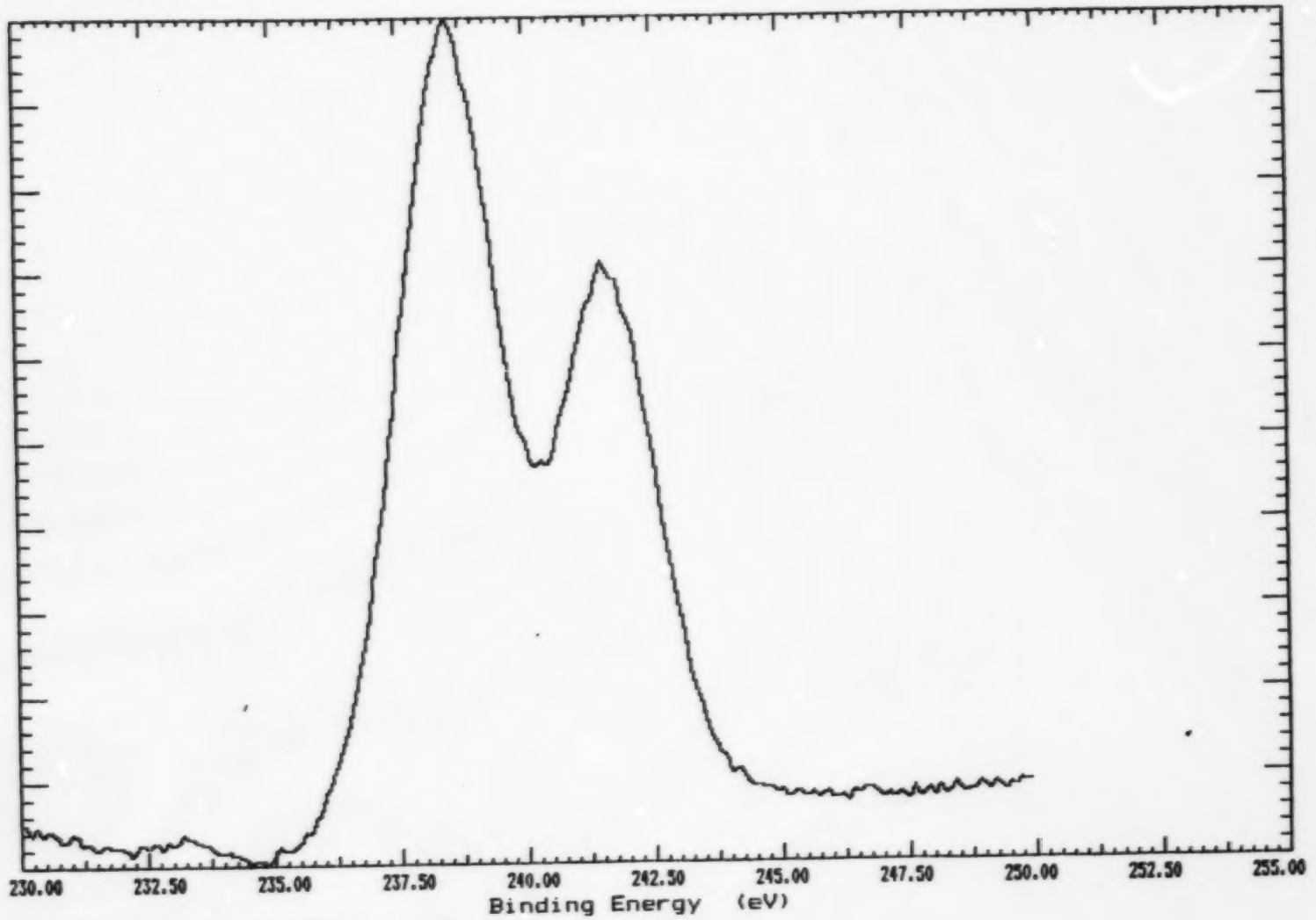
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2359
Step Size = 0.10 eV. 37 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

ASA36 Region 3 MO VG SCIENTIFIC

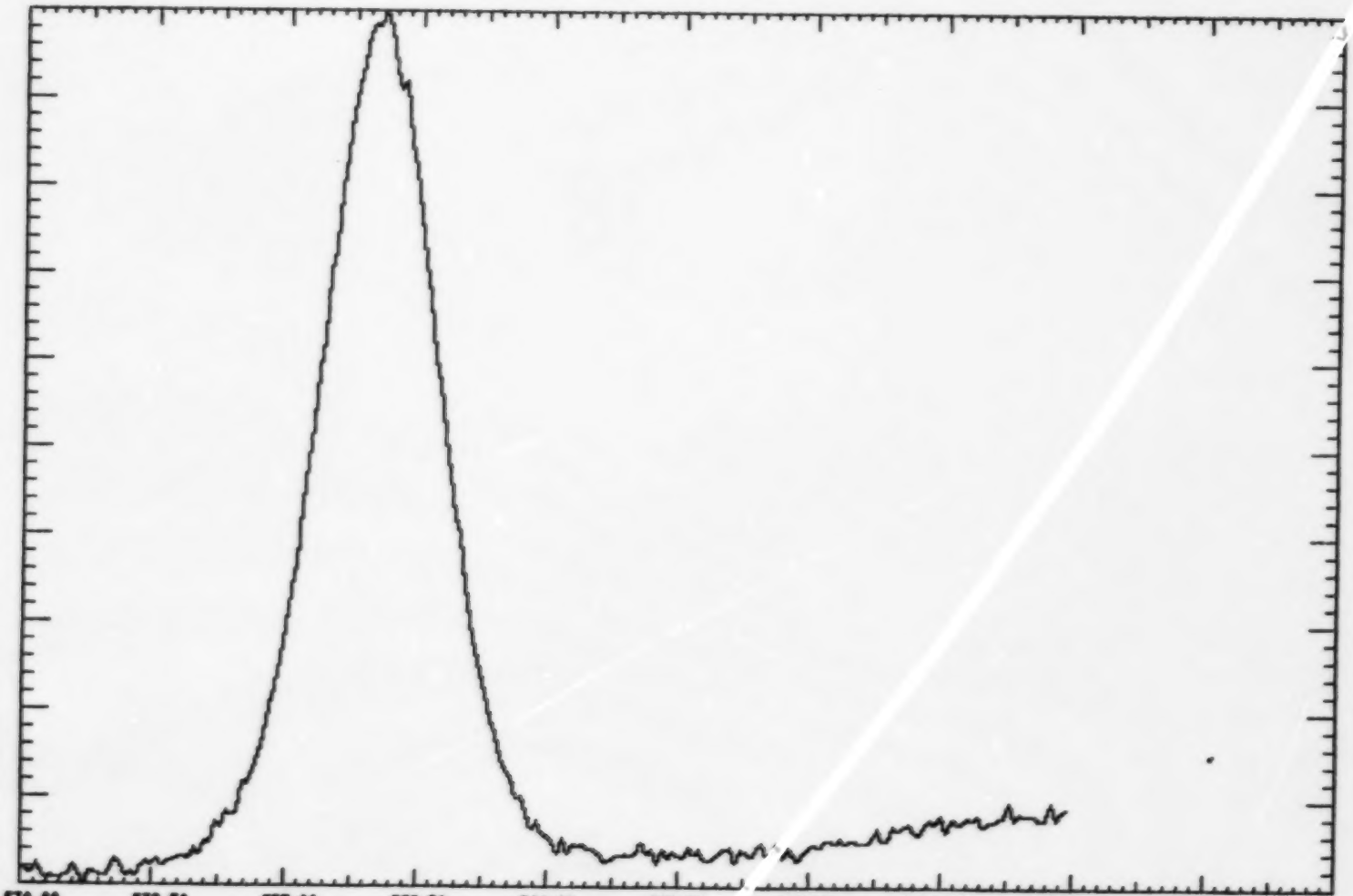
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3154
Step Size = 0.10 eV. 150 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

ASA36 Region 4 01S VG SCIENTIFIC

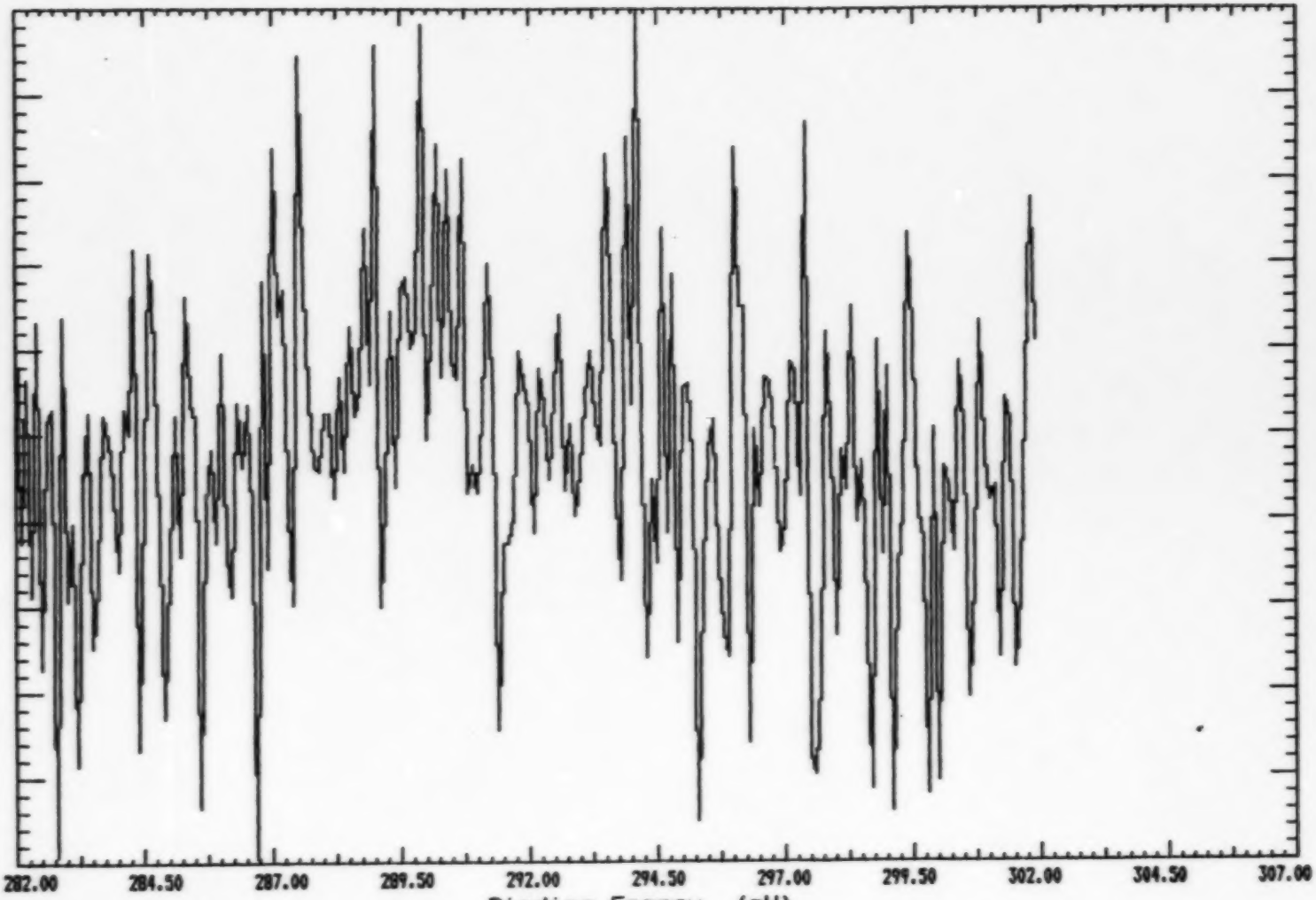
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 16851
Step Size = 0.10 eV. 7 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

SA36 Region 5 C1S VG SCIENTIFIC

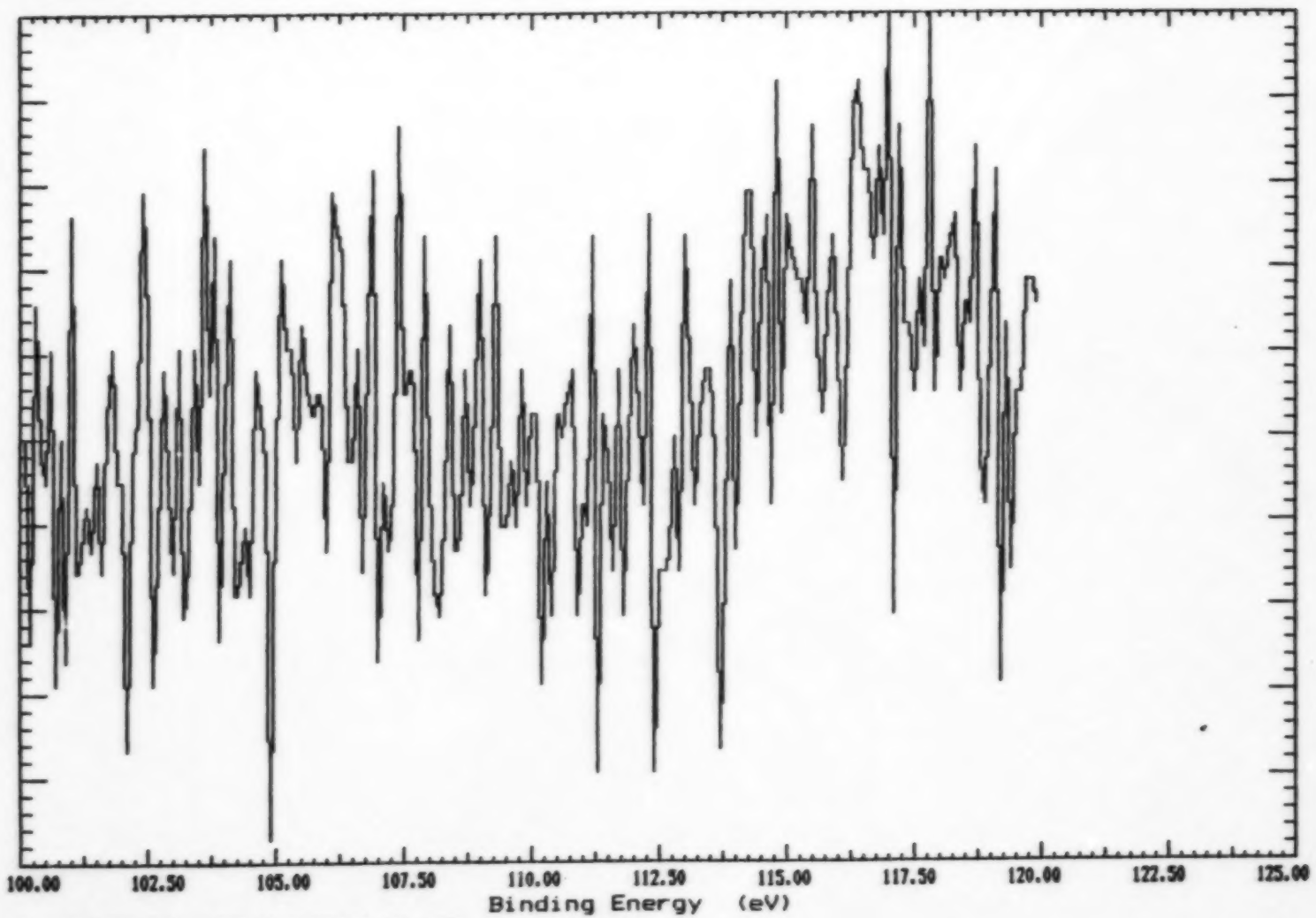
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 187
Step Size = 0.10 eV. 25 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

ASA36 Region 6 SI2P VG SCIENTIFIC

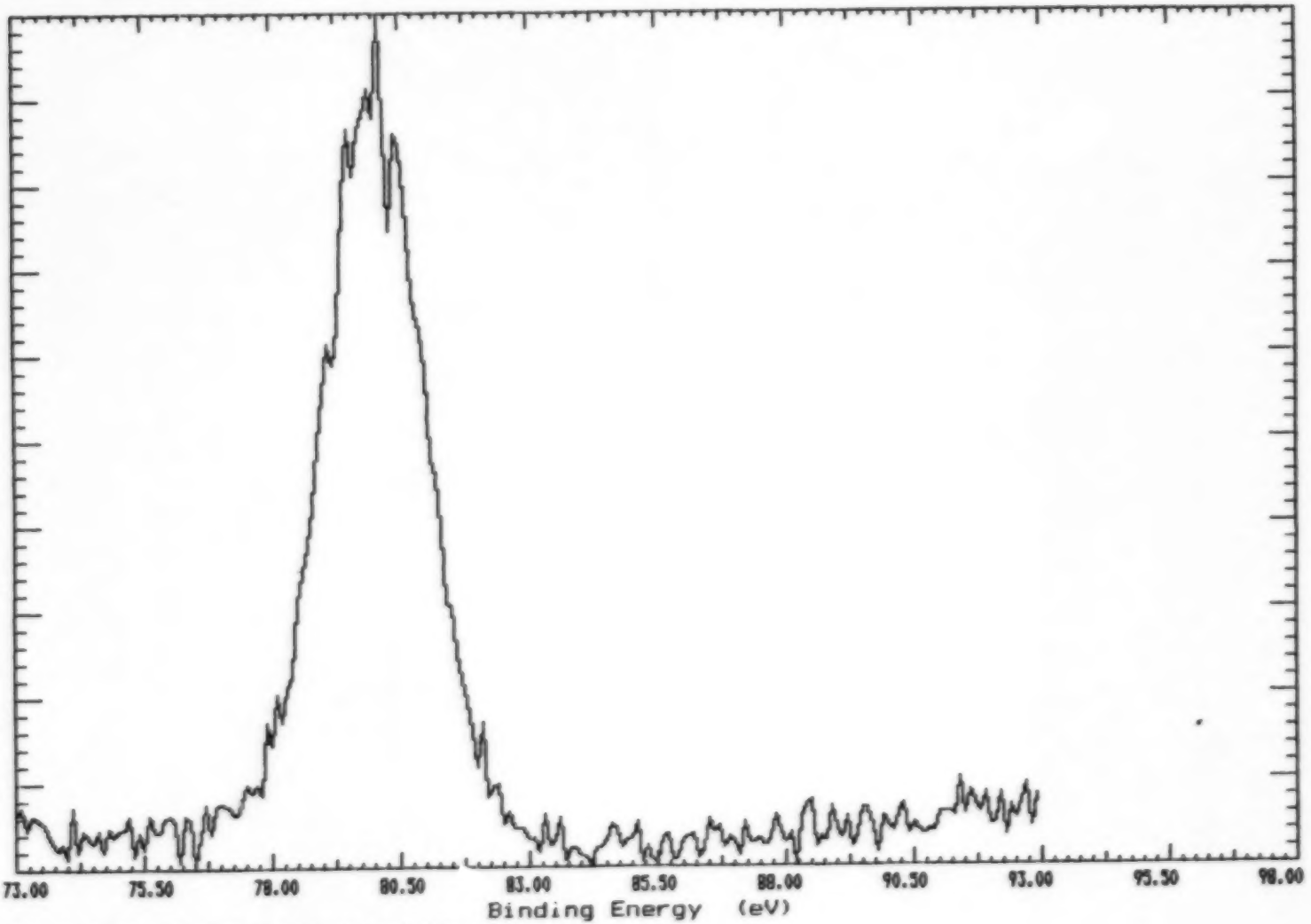
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 760
Step Size = 0.10 eV. 1 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
9H55 29 MARS 90

ASA36 Region 7 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2795
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-183 CM 15D/H MG300 C1 NR
OPT AL2P+MECA
QUEE 28 MARS 90

Molybdena-Alumina

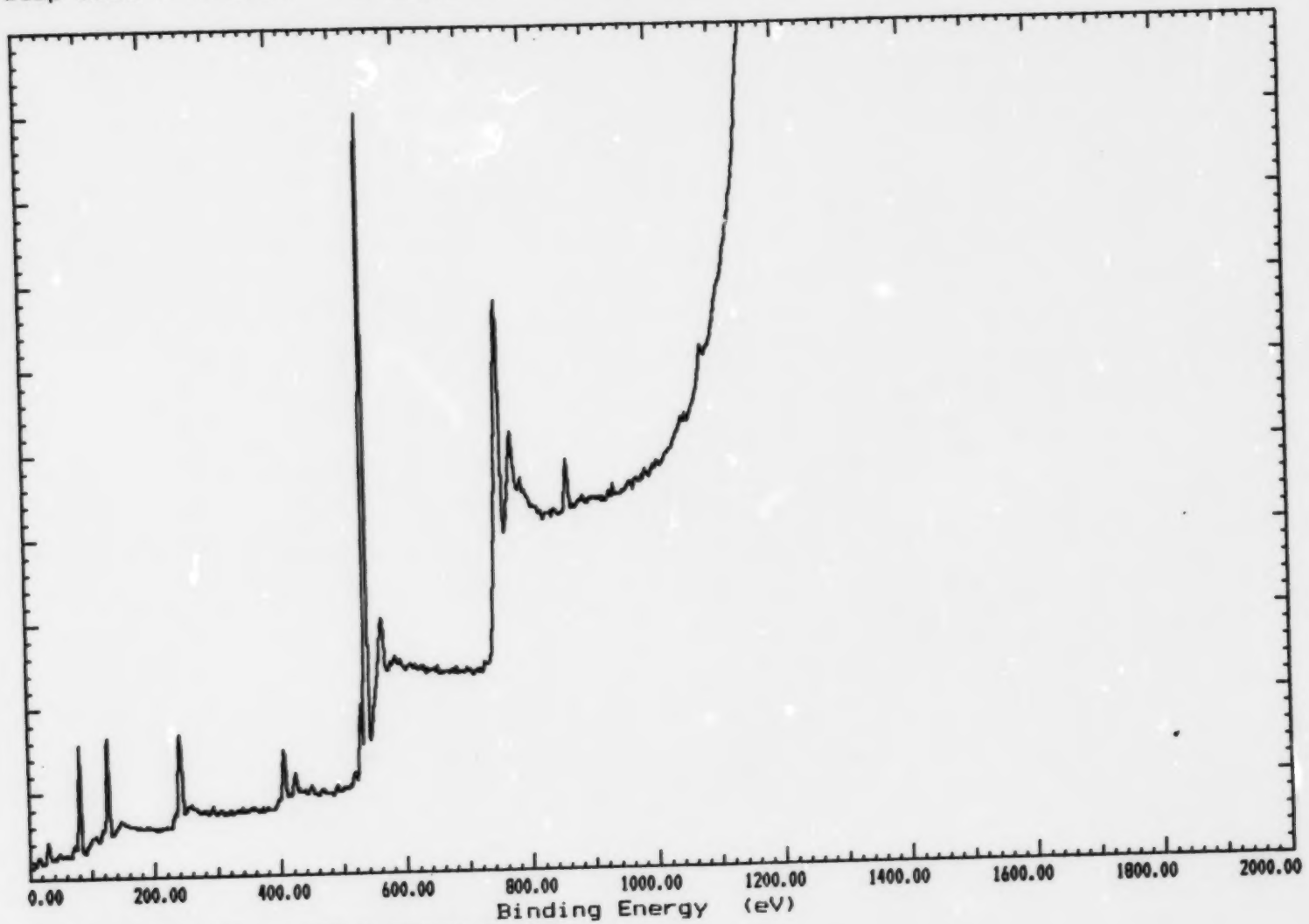
Sample No. 182 (9.30% Mo)

CALCINED AND GROUND

ASA37 Region 1 SURVEY

VG SCIENTIFIC

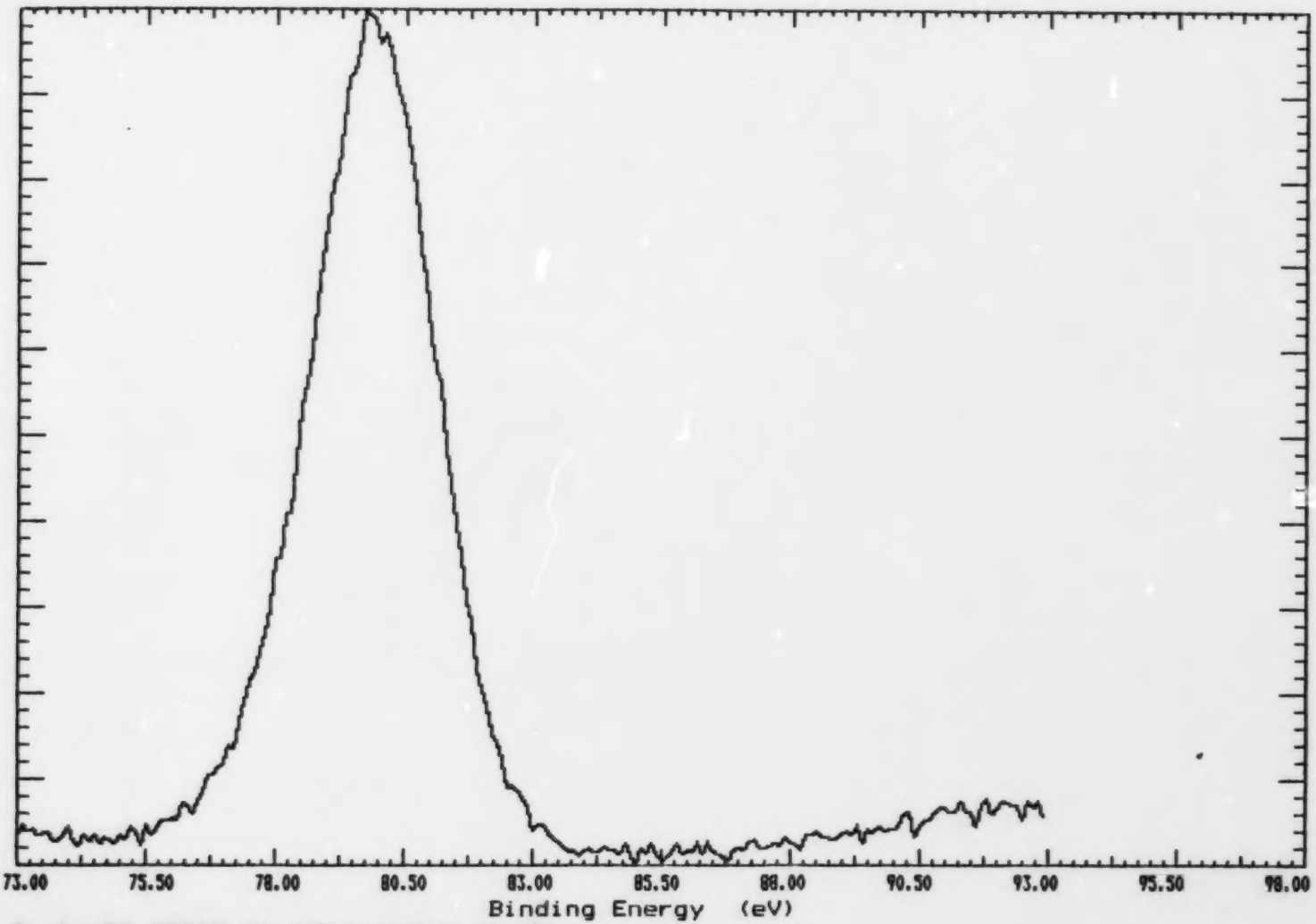
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 99447
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA
11H00 29 MARS 90

ASA37 Region 2 AL2P VG SCIENTIFIC

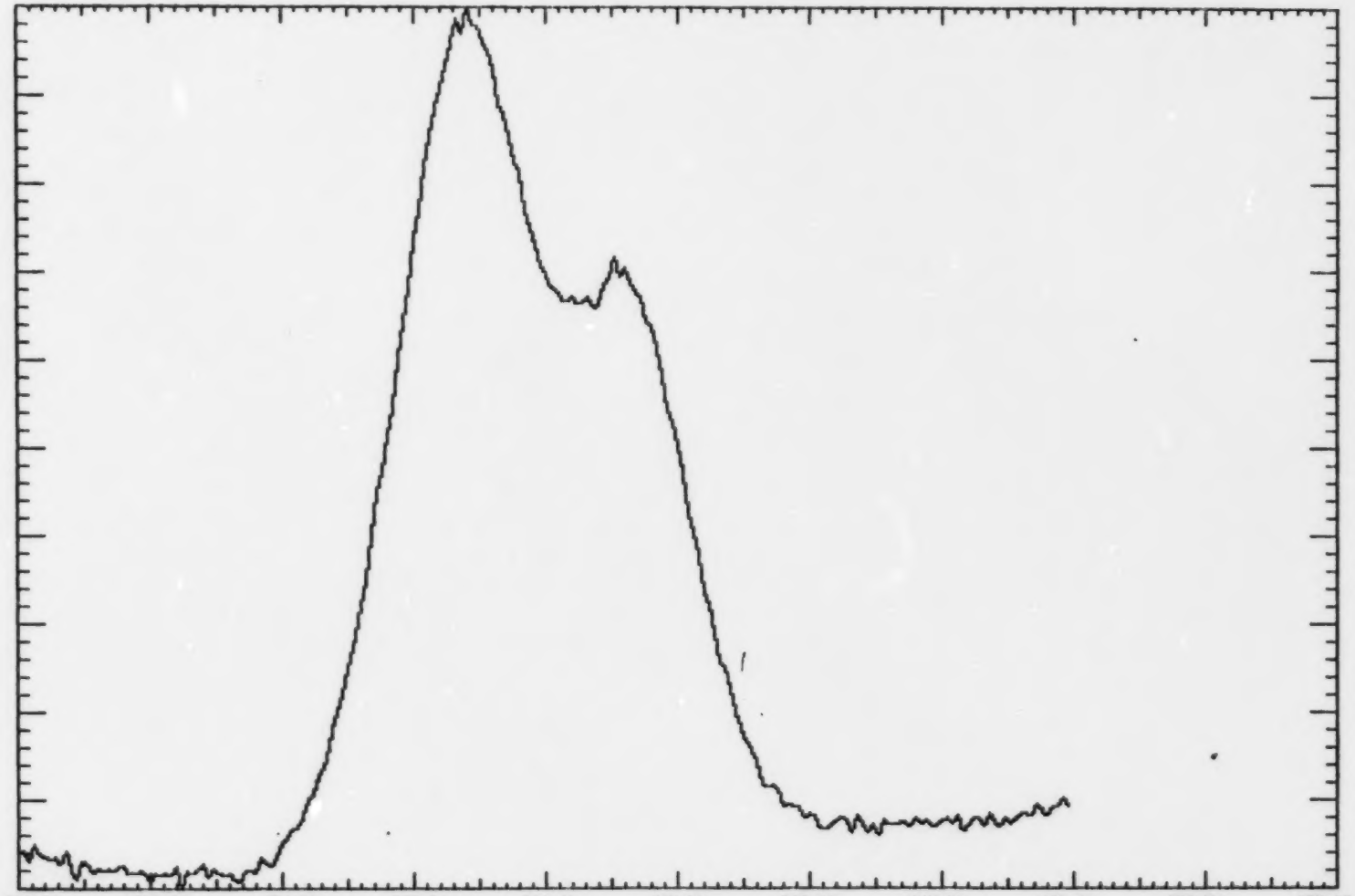
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2625
Step Size = 0.10 eV. 39 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA
11H00 29 MARS 90

ASA37 Region 3 MO VG SCIENTIFIC

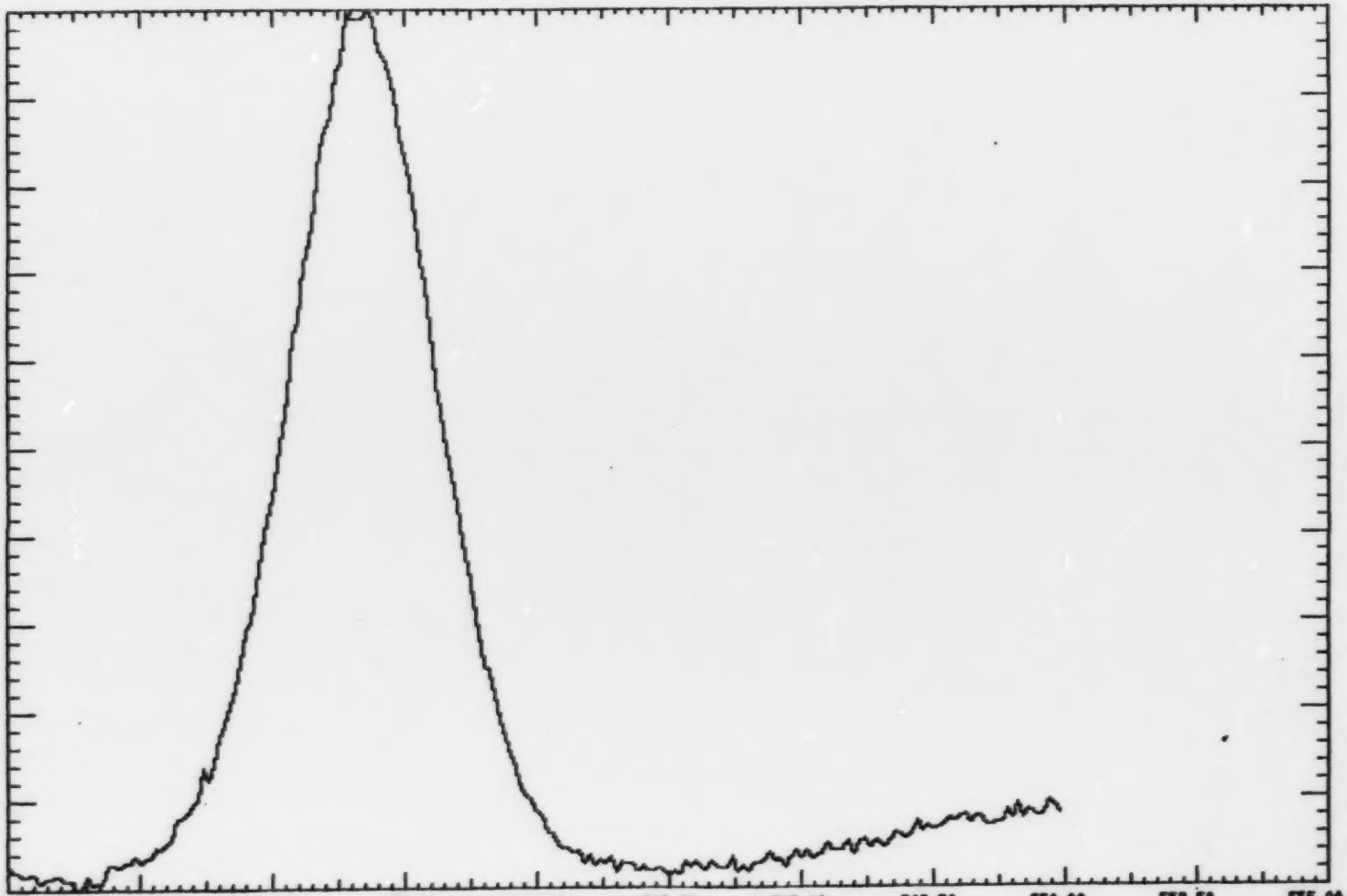
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2091
Step Size = 0.10 eV. 186 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA
11H00 29 MARS 90

ASA37 Region 4 O1S VG SCIENTIFIC

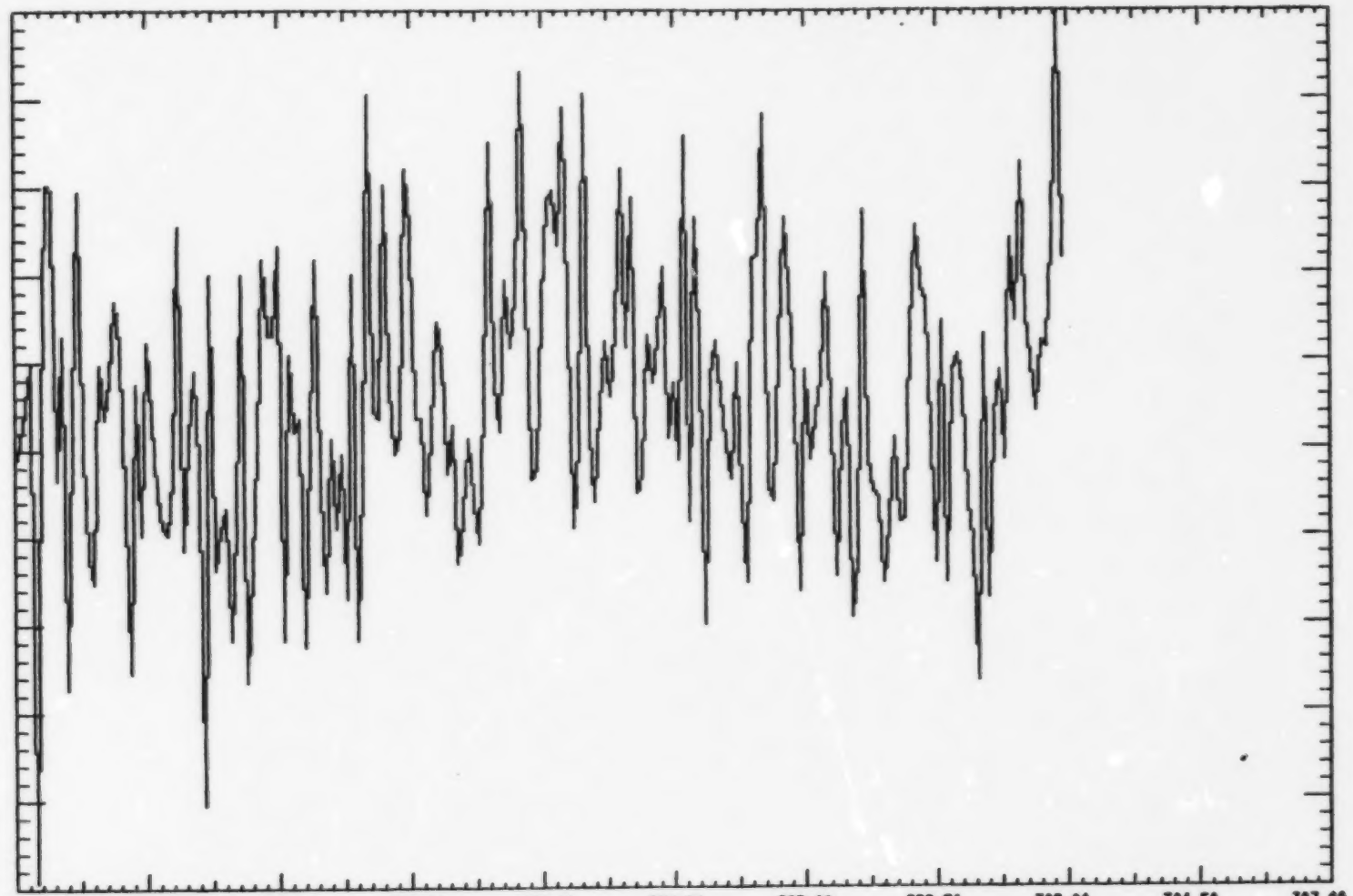
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 16865
Step Size = 0.10 eV. 10 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA

ASA37 Region 5 C1S VG SCIENTIFIC

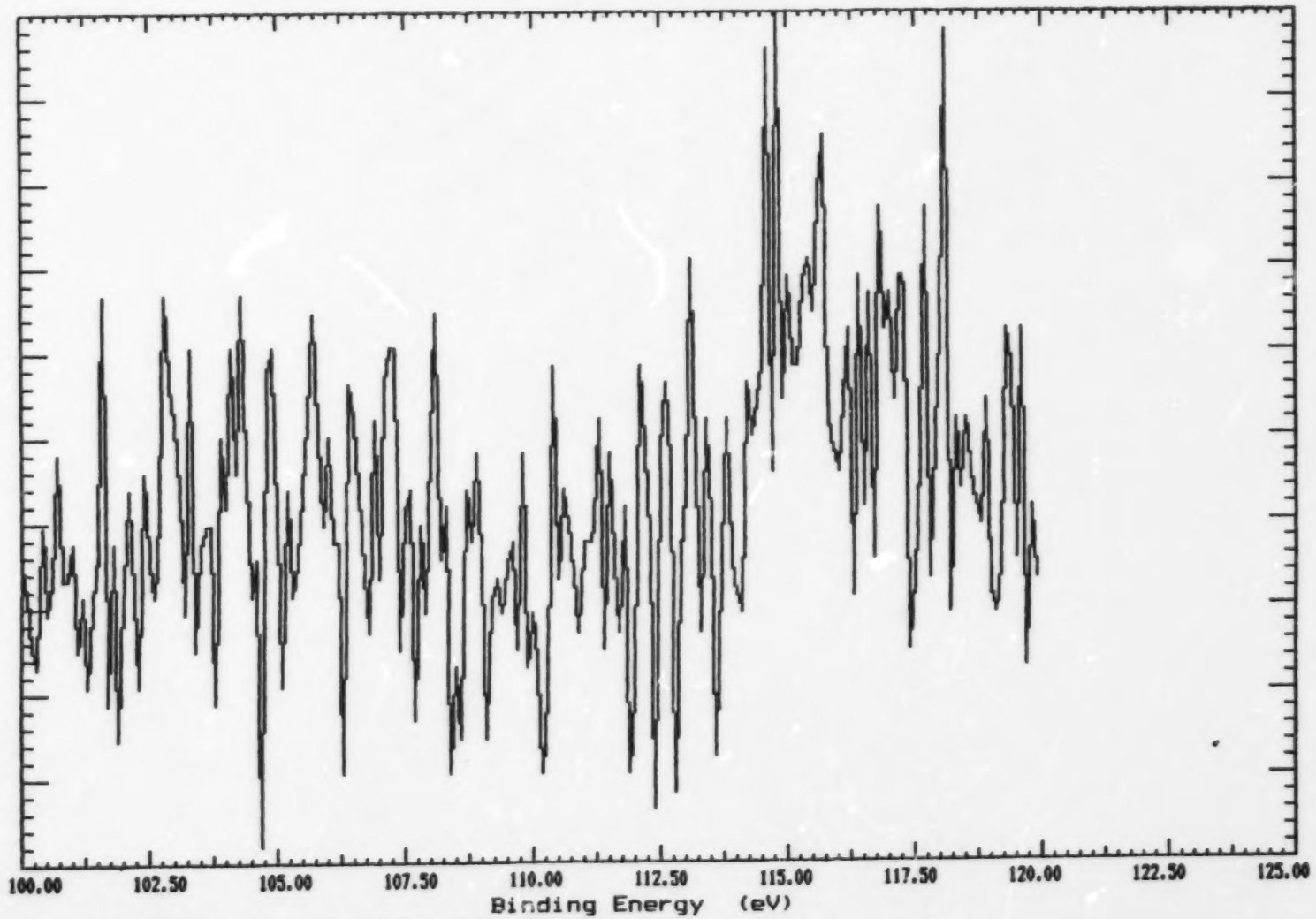
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 507
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA
11H00 29 MARS 90

ASA37 Region 6 SI2P VG SCIENTIFIC

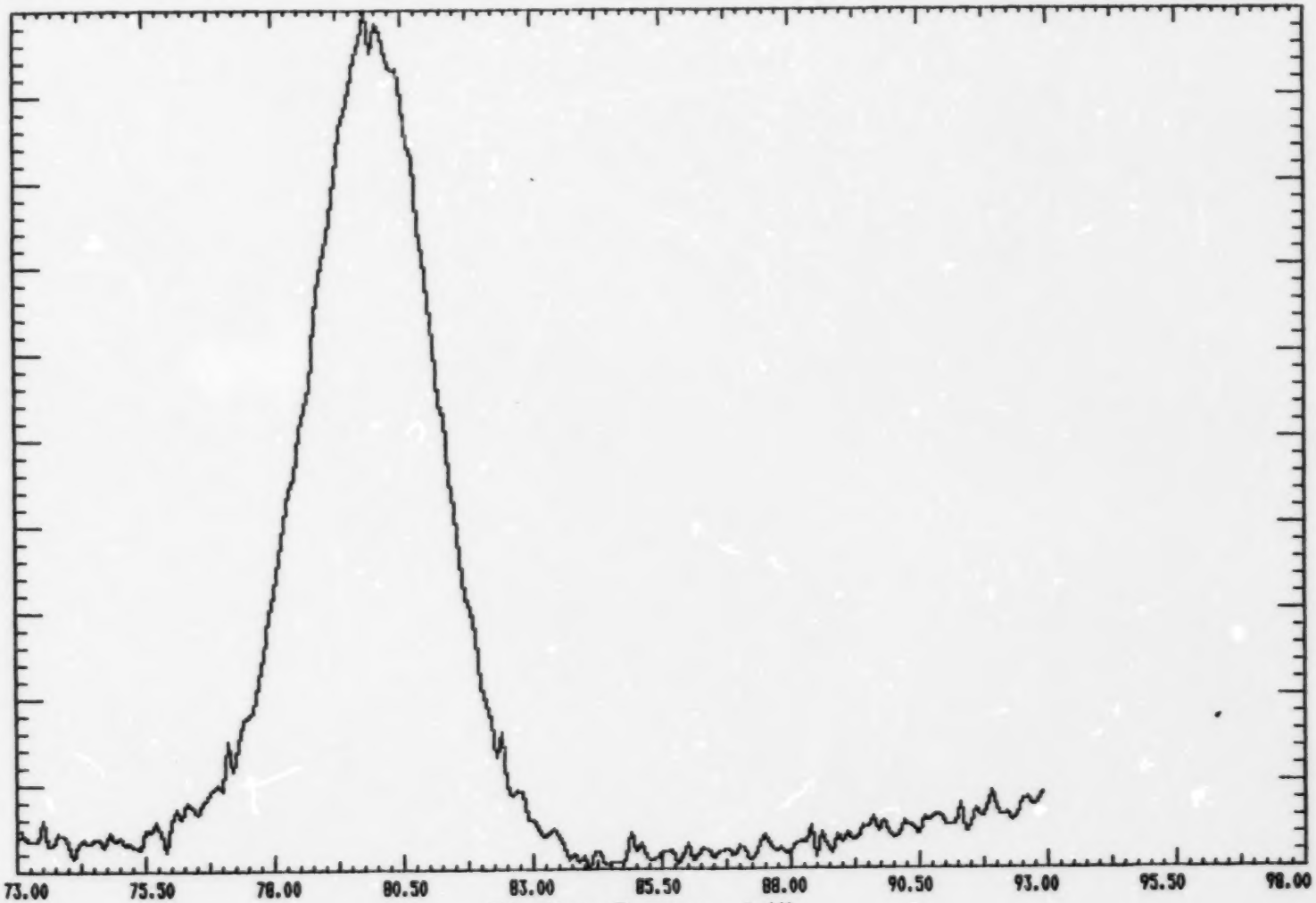
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 960
Step Size = 0.10 eV. 1 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA
11H00 29 MARS 90

ASA37 Region 7 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2635
Step Size = 0.10 eV. 24 Scans of 200 channels at 50 ms per chan



GL-4-183 BROYE CM 15D/H MG300 C1 NR
OPT AL2P+MECA